

ENVIRONMENTAL ASSESSMENT CONSTRUCTION OF AIR TRAFFIC CONTROL TOWER

TINKER AIR FORCE BASE, OKLAHOMA



**United States Air Force
Air Force Materiel Command**

Tinker Air Force Base, Oklahoma

March 2009

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**FINDING OF NO SIGNIFICANT IMPACT:
CONSTRUCTION OF AIR TRAFFIC CONTROL TOWER
TINKER AIR FORCE BASE
OKLAHOMA CITY, OKLAHOMA**

Introduction

Air Force Materiel Command Headquarters (AFMC/HQ) prepared an Air Traffic System Evaluation in 2004 that determined that the Air Traffic Control Tower (ATCT) operating at Tinker Air Force Base (AFB) in Oklahoma had a control tower cab that is too small for current operations. The existing ATCT facility is more than 35 years old and was built with limited equipment space and designed to accommodate only air traffic control (ATC) operations. Although multiple upgrades and repairs to the tower have been required over the years, several components of the existing ATCT do not comply with United States Air Force (USAF) and Unified Facilities Criteria (UFC) standards and siting criteria. The required number of personnel, combined with required equipment upgrades, continues to reduce available space in the cab, which is unsuitable for day-to-day operations. The overcrowded conditions jeopardize flying safety and periodically delay flying operations. Further, demands placed on the existing tower make it unsuitable for further expansion and degrade the adequacy of the work environment. Without a new ATCT at Tinker AFB, flight safety, as well as safety associated with taxiing aircraft or vehicular movement on airfield surfaces, would remain impaired.

To rectify this situation, the USAF proposes to construct a new ATCT in accordance with current standards, codes, siting criteria and Department of Defense (DoD) antiterrorism/force protection (AT/FP) requirements.

This Environmental Assessment (EA) addresses the potential impacts of the Proposed Action on the human and natural environment as required by the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] §§ 4321-4347), and in accordance with the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508) and Air Force Instruction (AFI) 32-7061, *Environmental Impact Analysis Process* (32 CFR Part 989).

Description of Proposed Action

The Proposed Action consists of the construction of a new 7,448-square foot, 11-story ATCT at Tinker AFB meeting current USAF standards. The construction would include reinforced concrete, drilled piers, a foundation and floor slab, supporting superstructure, an elevator, fire protection systems, back-up power, lightning protection, utilities, communications support, site preparation and drainage, access road and turnaround area, and other necessary support for a complete and usable facility. The total construction footprint, including parking and access road, is estimated to be 16,300 square feet.

Alternative 2: No-Action Alternative. Under the No-Action Alternative, Tinker AFB would not implement the Proposed Action, and current inefficiencies associated with overcrowded conditions in the tower cab would continue. These overcrowded conditions jeopardize flying safety and delay flying operations. Extensive building maintenance requirements would persist, and the ATCT would continue to operate in an area that violates USAF siting criteria.

Although this alternative would not fulfill the purpose and need of the Proposed Action, this alternative will be carried forward as required by the CEQ, which stipulates that the No-Action Alternative must be considered to assess environmental consequences that may occur if the Proposed Action is not implemented.

Anticipated Environmental Effects

Under Implementation of the Proposed Action:	
Air Quality	Increased particulate matter less than 10 microns in diameter (PM_{10}) emissions resulting from proposed construction activities would comprise short-term adverse impacts that could be mitigated through standard dust minimization practices. Once operational, long-term emissions from developed facilities would be negligible. Given that the proposed ATCT would house similar equipment currently in use in the existing ATCT, no new equipment that would have substantial emissions would be introduced. Emissions generated by implementation of the Proposed Action are expected to be below <i>de minimis</i> levels.
Noise and Vibration	Impacts of the Proposed Action would include short-term construction noise and long-term operational noise resulting from the back-up generator. These impacts would not result in notable changes in airfield noise contours and would be consistent with the existing surrounding noise environment. However, current noise at the proposed site is 75 to 80 Day-Night Average Sound Level (L_{dn}); therefore, noise reduction will be required within the ATCT. Noise and vibration impacts of the T-10 Hush House located near the Proposed Action site were evaluated to determine if they would be compatible with the proposed ATCT. These uses were found to be consistent. Negligible noise impacts would result from implementation of the Proposed Action.
Land Use	Since implementation of the Proposed Action would not require changes to land use designations or be considered incompatible with the Tinker AFB General Plan and Oklahoma City Southeast Sector Plan, implementation of the Proposed Action would not result in land use incompatibility or inconsistency in the vicinity of Tinker AFB.
Geological Resources	Implementation of the Proposed Action would require grading and site preparation would be required to support the building and parking area. Negligible impacts would result from implementation of the Proposed Action.
Water Resources	Contaminants, such as petroleum hydrocarbons, in run-off from developed areas of the site, including parking lots, could impact water quality in the area. These impacts would be minimized assuming existing non-point source pollution requirements are met and spill prevention and response procedures are implemented at the site. Further, implementation of best management practices (BMPs) – such as silt fencing, berm construction around construction sites, etc. – would minimize this potential to negligible impacts during construction. Over the long-term, no operations that would affect surface water are anticipated to occur. The Proposed Action site does not overlie any known groundwater contamination. It is unlikely that groundwater quality would adversely affect or be affected by constructing a new facility on this site assuming required controls for the handling of hazardous materials and for spill prevention and cleanup are implemented to protect groundwater. Implementation of the Proposed Action would not eliminate or modify any existing wetlands on Tinker AFB. No 100-year or 500-year floodplains have been identified on the proposed project site. However, since the current ATCT facility is located in a designated 100-year floodplain, removal of the current ATCT facility would reestablish permeable surface to the existing floodplain.

Finding of No Significant Impact

After careful review of the potential impacts of this Proposed Action, I have concluded that the action's implementation would not have a significant impact on the quality of the human or natural environment or generate significant controversy. Accordingly, the requirements of NEPA and CEQ regulations and 32 CFR 989, et seq. have been fulfilled, and an Environmental Impact Statement (EIS) is not necessary and will not be prepared.



ALLEN J. JAMERSON, Colonel, USAF
Commander, 72nd Air Base Wing

4 May 09

DATE

**ENVIRONMENTAL ASSESSMENT
CONSTRUCTION OF AIR TRAFFIC CONTROL TOWER**

TINKER AIR FORCE BASE, OKLAHOMA



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March 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

153

°F	degrees Fahrenheit	EIG	Engineering Installation Group
38 EIG	38 th Engineering Installation Group	EIS	Environmental Impact Statement
72 ABW	72nd Air Base Wing	EO	Executive Order
507 ARW	507 th Air Refueling Wing	ERP	Environmental Restoration Program
AFB	Air Force Base	ESA	Endangered Species Act
AFCESA	Air Force Civil Engineer Support Agency	FAA	Federal Aviation Administration
AFH	Air Force Handbook	FEMA	Federal Emergency Management Agency
AFI	Air Force Instruction	FICON	Federal Interagency Committee on Noise
AFMC/HQ	Air Force Materiel Command/Headquarters	FONSI	Finding of No Significant Impact
AGE	aerospace ground equipment	GWTP	Ground Water Treatment Plant
AGL	above ground level	HAP	Hazardous Air Pollutant
AGS	Air Guard Station	HMMP	Hazardous Materials Management Program
AICUZ	Air Installation Compatible Use Zone	HMMS	Hazardous Material Management System
AIRFA	American Indian Religious Freedom Act	HUD	US Department of Housing and Urban Development
ANSI	American National Standards Institute	Hz	Hertz
AP	Accumulation Point	I-	Interstate
APZ	Accident Potential Zone	IAP	Initial Accumulation Point
AST	aboveground storage tank	ICRMP	Integrated Cultural Resource Management Plan
ATC	Air Traffic Control	IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
ATCT	Air Traffic Control Tower	IRP	Installation Restoration Program
AT/FP	Antiterrorism/Force Protection	IWTP	Industrial Wastewater Treatment Plant
Airlift Wing	Airlift Wing	JP-	jet fuel
AWAC	Airborne Warning and Control	kVA	kilovolt-amperes
B	Building	L _{dn}	Day-Night Average Sound Level
BACT	best available control technology	LLSZ	Lower-Lower Saturated Zone
BASH	Bird/Wildlife Aircraft Strike Hazard	LQG	Large Quantity Generator
bgs	below ground surface	LSZ	Lower Saturated Zone
BMP	best management practice	LUC	land use control
BRAC	Base Realignment and Closure	MIL HDBK	Military Handbook
CAA	Clean Air Act	MLRA	major land resource area
CAAA	Clean Air Act Amendments	MSDS	Material Safety Data Sheets
CE	Civil Engineering	MS4	Municipal Separate Storm Sewer
CEQ	Council on Environmental Quality	MSGP	Multi-Sector General Permit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	NAAQS	National Ambient Air Quality Standards
CFR	Code of Federal Regulations	NAGPRA	Native American Graves Protection and Repatriation Act
CMS	corrective measure studies	NAVAID	Navigational Aid
CNG	Compressed Natural Gas	NEPA	National Environmental Policy Act
CO	carbon monoxide	NESHAP	National Emission Standards for Hazardous Air Pollutants
CP	Collection Point	NFPA	National Fire Protection Association
CWA	Clean Water Act	NHPA	National Historic Preservation Act
CZ	Clear Zone	NO ₂	nitrogen dioxide
dB	decibels	NO _x	nitrogen oxides
dBA	A-weighted decibels	NPL	National Priorities List
DEQ	Oklahoma Department of Environmental Quality	NRHP	National Register of Historic Places
DoD	U.S. Department of Defense	NWI	National Wetlands Inventory
DRMO	Defense Reutilization and Marketing Office	O ₃	ozone
EA	Environmental Assessment	OC-ALC	Oklahoma City Air Logistics Center
ECAMP	Environmental Compliance Assessment and Management Program		
EIAP	Environmental Impact Analysis Process		

LIST OF ACRONYMS AND ABBREVIATIONS (Cont.)

OCC	Oklahoma Corporation Commission
OCCVB	Oklahoma City Convention and Visitors Bureau
ODWC	Oklahoma Department of Wildlife Conservation
ONHI	Oklahoma Natural Heritage Inventory
ORBKA	Oklahoma Risk-Based Corrective Action
OU	University of Oklahoma
OWRB	Oklahoma Water Resources Board
PA	preliminary assessment
Pb	lead
PM	particulate matter
PM ₁₀	particulate matter less than 10 microns in diameter
PM _{2.5}	particulate matter less than 2.5 microns in diameter
POL	petroleum, oil, and lubricants
POV	privately owned vehicles
PPV	peak particle velocity
PSD	Prevention of Significant Deterioration
PZ	Production Zone
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigations
RI/FS	remedial investigations/feasibility studies
RMS	root mean square
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SOF	Supervisor of Flying
STP	Sanitary Treatment Plant
SWPPP	Storm Water Pollution Prevention Program
TAFBI	Tinker Air Force Base Instruction
T-ETVS	Transportable-Enhanced Terminal Voice Switch
TCP	Traditional Cultural Property
TPW	Texas Parks and Wildlife
tpy	tons per year
TSDF	Treatment, Storage and Disposal Facility
UFC	Unified Facilities Criteria
UPS	Uninterruptible Power Supply
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
USZ	Upper saturated zone
VOC	volatile organic compound
WSA	Waste Staging Area

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SECTION 1 OVERVIEW

156 1.1 Introduction

157 Air Force Materiel Command Headquarters (AFMC/HQ) prepared an Air Traffic System
158 Evaluation in 2004 that determined that the Air Traffic Control Tower (ATCT) operating at
159 Tinker Air Force Base (AFB) in Oklahoma had a control tower cab that is too small for current
160 operations. The existing ATCT facility is more than 35 years old and was built with limited
161 equipment space and designed to accommodate only air traffic control (ATC) operations.
162 Although multiple upgrades and repairs to the tower have been required over the years, several
163 components of the existing ATCT do not comply with United States Air Force (USAF) standards
164 and siting criteria. The required number of personnel, combined with required equipment
165 upgrades, continues to reduce available space in the cab, which is unsuitable for day-to-day
166 operations. The overcrowded conditions jeopardize flying safety and periodically delay flying
167 operations. Furthermore, demands placed on the existing tower make it unsuitable for further
168 expansion and degrade the adequacy of the work environment. Without a new ATCT at Tinker
169 AFB, flight safety, as well as safety associated with taxiing aircraft or vehicular movement on
170 airfield surfaces, would remain impaired.

171 To remedy this situation, the USAF proposes to construct a new ATCT in accordance with
172 current standards, codes, siting criteria, and Department of Defense (DoD) antiterrorism/force
173 protection (AT/FP) requirements.

174 This Environmental Assessment (EA) addresses the potential impacts of the Proposed Action on
175 the human and natural environment as required by the National Environmental Policy Act
176 (NEPA) of 1969, as amended (42 United States Code [USC] §§ 4321-4347), and in accordance
177 with the Council on Environmental Quality (CEQ) regulations implementing the procedural
178 provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508) and Air Force
179 Instruction (AFI) 32-7061, *Environmental Impact Analysis Process* (32 CFR Part 989).

180 1.2 Purpose and Need

181 The *purpose* of the Proposed Action is to construct a new ATCT that is large enough to
182 accommodate air traffic control operations, controller administrative functions, personnel
183 training, crew briefings, electronic equipment maintenance, radio and telephone support
184 equipment, and environmental controls. Construction of a new ATCT would also facilitate
185 compliance with current USAF siting criteria for control towers, provide an adequate fire
186 suppression system, and result in several upgrades over the current ATCT (e.g., safer stairways,
187 the ability of the tower to withstand greater wind speeds, safer access to the exterior of windows
188 [for cleaning], and a new roof).

189 The *need* for the Proposed Action has arisen because the existing ATCT facility (Building 935)
190 was designed and built in 1970 to accommodate only air traffic control operations and has
191 limited equipment space. Structural, mechanical, and electrical components of the existing tower
192 facility have deteriorated to the point that frequent repairs are required. To date, base Civil
193 Engineering (CE) personnel have been able to accomplish these repairs and renovations;
194 however, costs associated with these elevated maintenance requirements will soon exceed the
195 benefits associated with prolonging the tower's lifespan. Further, in its present location, the
196 ATCT violates current USAF siting criteria and Unified Facilities Criteria (UFC) 3-260-01,
197 which state that towers will not be sited less than 1,000 feet from an active runway centerline.
198 Additionally, while operations of the ATCT have remained relatively constant, an increasing
199 number of personnel working in the tower cab, along with equipment additions and upgrades,
200 will eventually render the cab space unsuitable for day-to-day operations.

201 There is insufficient space available to carry out the administrative, training, and management
202 functions associated with tower operations. The tower cab, which comprises the top floor of the
203 control tower within which tower personnel direct air traffic, is too small to accommodate all the
204 occupants and trainees. Cramped conditions in the tower cab make it difficult for the controllers
205 to maneuver and to monitor aircraft activity through the tower cab windows. The *2004 Air*
206 *Traffic System Evaluation* prepared by AFMC/HQ states: "The size and noise level in the tower
207 cab is far from ideal in accommodating the five control positions." During the evaluation period,
208 as many as 12 people were in the tower cab performing official duties and if measures are not
209 taken to limit the number of people or modify/replace the tower cab, the noise level and
210 attendant distractions may lead to an erosion of the quality of air traffic control service." It has
211 been mandated that a new position for the Supervisor of Flying (SOF) be in the control tower
212 cab, which will further constrain the already limited space.

213 The ATCT consists of ten floors and the tower cab and has a small elevator serving the first eight
214 floors. Conventional steel stairs serve as the primary access from the first floor to the tenth floor,
215 with a steep "ship's ladder" providing access to the tower cab from the tenth floor. A small,
216 half-height door serves as access to the narrow tower catwalk. An emergency "Baker-Life
217 Chute" mounted on the tower catwalk serves as an alternate means of egress in case of fire. The
218 set of stairs leading to the tower cab is steep and not very deep. Several controllers have fallen
219 or lost their footing and slid down these steps. One controller was unable to work for several
220 months with a head injury that resulted from a stairway fall. The current USAF-standard tower
221 design does not contain these types of stairs.

222 The existing ATCT is substandard and is not adequate to allow renovation to incorporate all
223 current ATCT functions. It is neither cost effective nor practical to renovate the existing ATCT
224 cab in order to comply with the current Life and Fire Safety standards and seismic requirements.

225 In addition to major functional and location issues cited above, numerous nuisances associated
226 with the current ATCT would also be rectified under development of a new ATCT, including:

227 • Leaking roofs and ceilings;
228 • Offices without central heating/air conditioning; and
229 • Replacement of noisy and poorly sealed heating/ air conditioning wall units, which
230 permit internal wind drafts and seasonal insect infestations.

231 **1.3 Location, History, and Current Mission**

232 **1.3.1 Tinker AFB**

233 Tinker AFB is located within the city limits of Oklahoma City, 5 miles east of downtown
234 (Figure 1-1). The main portion of the base is bordered to the north by Interstate 40 (I-40) and
235 29th Street, to the east by Douglas Boulevard, to the south by 74th Street, and to the west by
236 Sooner Road. Midwest City and Del City are located north and northwest of Tinker AFB,
237 respectively.

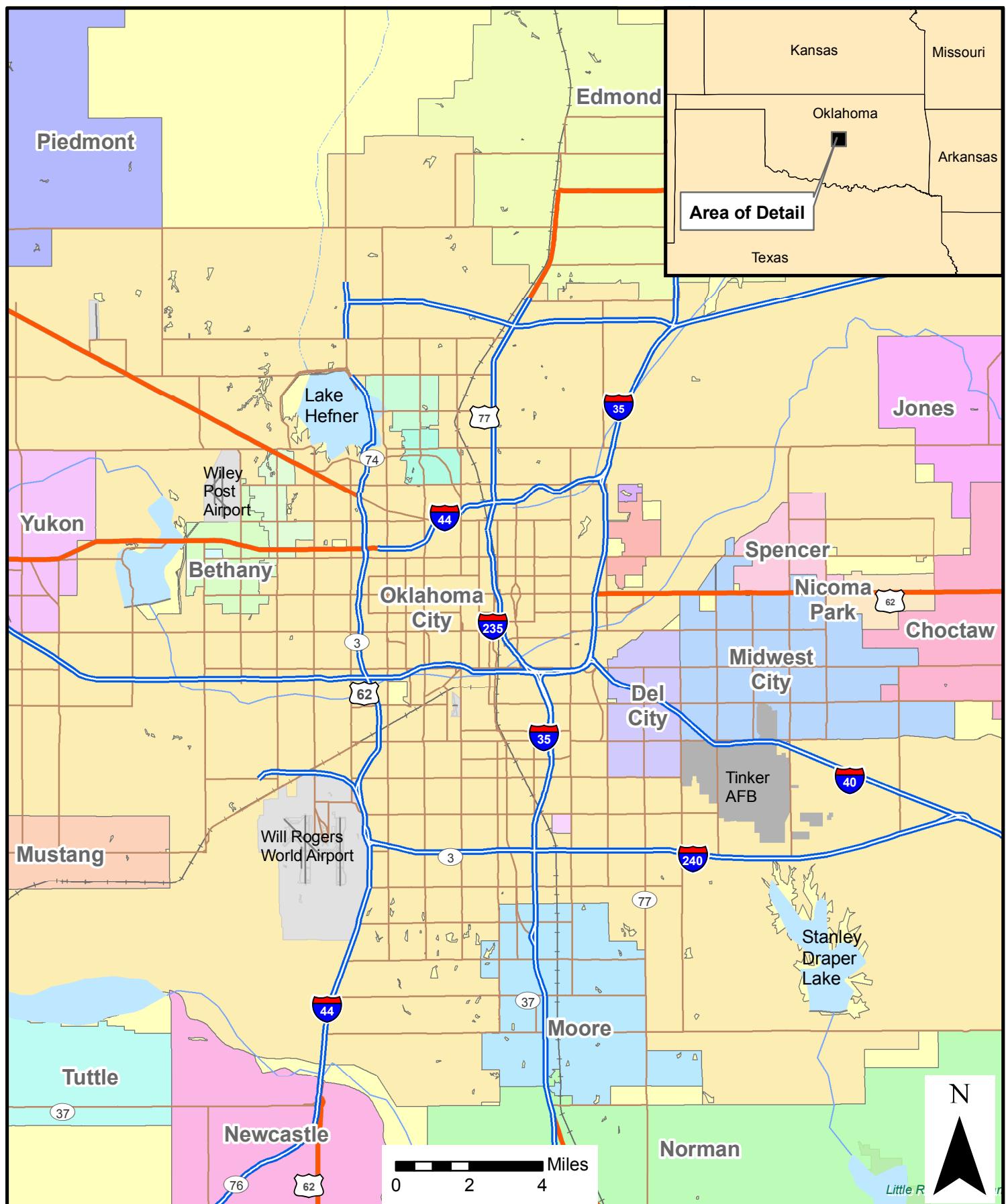
238 Tinker AFB's history began in 1940 when a group of Oklahoma City civic leaders and
239 businessmen learned that the War Department was considering the central United States as a
240 location for a maintenance and supply depot. On 8 April 1941, the order was officially signed
241 awarding the depot to Oklahoma City.

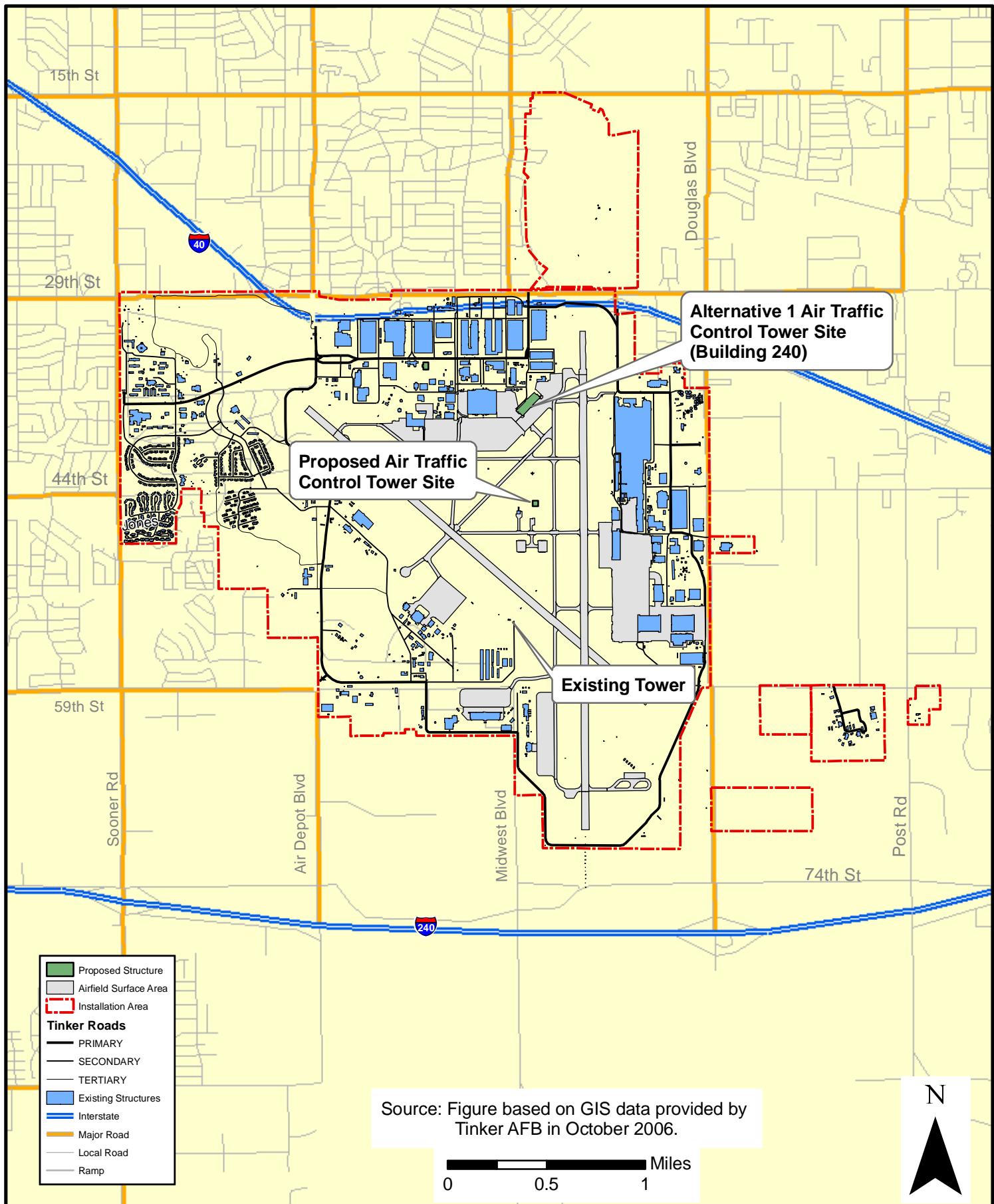
242 Oklahoma Air Depot was renamed "Tinker AFB" in honor of Major General Clarence L. Tinker
243 of Pawhuska, Oklahoma. General Tinker lost his life while leading a strike against Japanese
244 forces on Wake Island during the early months of World War II.

245 Since its establishment, Tinker AFB has expanded its real property assets to include more than
246 5,033 acres. In the 1960s, 1970s, and 1980s, the base acquired maintenance responsibilities for
247 additional aircraft, engines, and equipment; the additional associate organizations and
248 responsibilities resulted in an increase in both civilian and military personnel. In the 1970s, the
249 base took over management of new weapons including the A-7D Corsair, the E-3A Airborne
250 Warning and Control (AWAC) aircraft, the E-4 Airborne Command Post aircraft, and air- and
251 ground-launched missiles.

252 Tinker AFB's largest organization is the Oklahoma City Air Logistics Center (OC-ALC). The
253 OC-ALC is the largest of three Air Logistic Centers in the AFMC and provides depot
254 maintenance, product support, services and supply chain management, as well as information
255 support for 31 weapon systems, 10 commands, 93 Air Force bases, and 46 foreign nations. The
256 OC-ALC is the worldwide manager for a wide range of aircraft, engines, missiles, software, and
257 avionics and accessories components.

258 Currently, Tinker AFB contains 716 buildings (comprising 15.9 million square feet), an airfield,
259 and other facilities that support various associate units at the base (Figure 1-2). Tinker AFB
260 provides specialized logistics support, management, maintenance, and distribution to





EA

**Layout Map
Construction of Air Traffic Control Tower
Tinker Air Force Base**

FIGURE

1-2

263 defense weapons systems worldwide. Tinker AFB is divided into seven districts, each with
264 specific land uses. The 72nd Air Base Wing (72 ABW) is the host command. Associate units
265 located at the base include the OC-ALC, the 552nd Air Control Wing, the 507th Air Refueling
266 Wing, the United States (U.S.) Navy Command Strategic Communications Wing One, the 3rd
267 Combat Communications Group (3 CCG), and the 38th Engineering Installation Group (38 EIG).

268 **1.3.2 72 ABW**

269 Serving as the host organization at Tinker AFB, the 72 ABW provides critical base-wide
270 functions including security, environmental, medical services, civil engineering, planning, fire
271 protection, supply, communications, and airfield operations. The 72 ABW was activated at
272 Tinker AFB on 1 October 1994. Organizations assigned to the 72 ABW include: 72nd Medical
273 Group, 72nd Support Group, 72nd Operations Support Squadron, 72nd Civil Engineering Group,
274 72nd Logistics Directorate, the Base Chapel, and the offices for Plans, Military Equal
275 Opportunity, International Military Students, and Arms Control.

276 **1.4 Summary of Environmental Study Requirements**

277 The Environmental Impact Analysis Process (EIAP) is the process by which federal agencies
278 facilitate compliance with environmental regulations. NEPA is the primary legislation affecting
279 these agencies' decision-making process. This act and other facets of the EIAP are described
280 below.

281 **1.4.1 National Environmental Policy Act**

282 NEPA requires that federal agencies consider potential environmental consequences of proposed
283 actions. The law's intent is to protect, restore, or enhance the environment through well-
284 informed federal decisions. The CEQ was established under NEPA for the purpose of
285 implementing and overseeing federal policies as they relate to this process. In 1978, the CEQ
286 issued *Regulations for Implementing the Procedural Provisions of the National Environmental*
287 *Policy Act* (40 CFR §§1500-1508 [CEQ 1978]). The Air Force developed its own procedural
288 regulations for implementing NEPA entitled *Environmental Impact Analysis Process* (AFI 32-
289 7061, codified at 32 CFR Part 989). These regulations specify that an EA be prepared to:

290 • Briefly provide sufficient analysis and evidence for determining whether to prepare an
291 Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
292 • Aid in an agency's compliance with NEPA when no EIS is necessary; and
293 • Facilitate preparation of an EIS when one is necessary.

294 Furthermore, to comply with other relevant environmental requirements (e.g., the Safe Drinking
295 Water Act, Endangered Species Act [ESA], and National Historic Preservation Act [NHPA]),
296 and to assess potential environmental impacts, the EIAP and decision-making process for the
297 proposed action involves a thorough examination of all environmental issues pertinent to the

298 action. The decision-making process includes a study of environmental issues related to the
299 proposed operations changes at Tinker AFB.

300 **1.4.2 Scope of the Environmental Assessment**

301 This EA will address the full breadth of potential environmental, cultural and socioeconomic
302 impacts associated with the Proposed Action. The geographic area addressed will include the
303 Proposed Action site and immediately surrounding environs. In addition to the Proposed Action,
304 the EA will assess potential impacts associated with reasonable alternatives to the Proposed
305 Action and actions associated with the Proposed Action.

306 Resources analyzed will include the standard required Critical Elements of the Human
307 Environment, as defined by NEPA, as well as additional issues identified by Tinker AFB staff
308 and the USAF. The scope of analyses is based on the requirements of CEQ and the additional
309 resources were identified by Tinker AFB staff.

310 **1.4.3 Interagency and Intergovernmental Coordination for Environmental Planning**

311 Public involvement is a useful component of the EA process; it includes both agencies and
312 members of the public. Public involvement occurs primarily during the 15-day public comment
313 period.

314 Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) is a
315 federally mandated process for informing and coordinating with other governmental agencies
316 regarding proposed actions. As detailed in 40 CFR § 1501.4(b), CEQ regulations require
317 intergovernmental notifications prior to making any detailed statement of environmental impacts.
318 Through the IICEP process (per AFI 32-7060, *Interagency and Intergovernmental Coordination*
319 *for Environmental Planning*), the USAF notifies relevant federal, state, and local agencies and
320 allows them sufficient time to make known their environmental concerns specific to a proposed
321 action. Comments and concerns submitted by these agencies during the IICEP process are
322 subsequently incorporated into the analysis of potential environmental impacts conducted as part
323 of the EA.

324 Application for and acquisition of the Federal Aviation Administration (FAA) Form 4060 Permit
325 to Construct will also be required prior to implementation of the Proposed Action; as part of that
326 application process, the FAA will receive a copy of the EA. The draft EA was sent directly to
327 identified agencies, and a Notice of Availability for public review of the Draft EA was published
328 in *The Oklahoman* on February 20, 2009 (Appendix A). The Draft EA was available for public
329 review at the Midwest City Public Library. The public review period lasted 15 days and no
330 public comments were received; therefore, no responses to comments were needed to be
331 incorporated as part of the Final EA.

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SECTION 2

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

336 2.1 **Introduction**

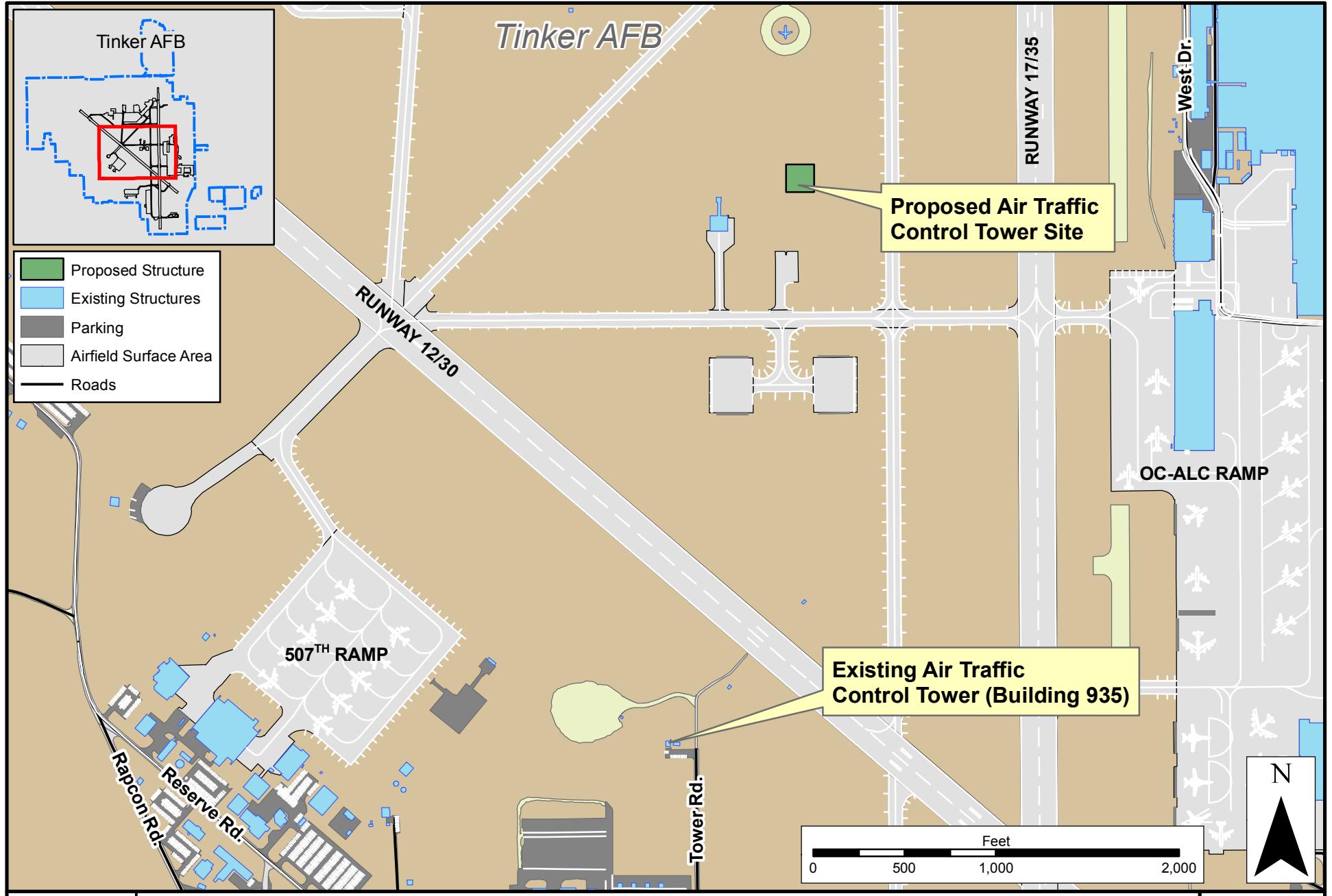
The USAF has determined that a new ATCT at Tinker AFB, Oklahoma is necessary to provide adequate space for air traffic control operations and to comply with current USAF siting criteria, which require the ATCT to be sited more than 1,000 feet from the runway centerline. Furthermore, a new, properly sited ATCT at Tinker AFB would provide air traffic controllers a clear view of the runways, traffic patterns, alert areas, restricted areas, and parking aprons to ensure adequate and safe airborne and ground traffic control at and around the airfield.

The new ATCT must be constructed to comply with UFC 3-260-01 for *Airfield and Heliport Planning and Design* (Air Force Civil Engineer Support Agency [AFCESA] 2006) and the *Design Guide for Air Traffic Control Towers (ATCT)* (USAF 2001b). The new tower must also comply with AT/FP requirements which would minimize the possibility of mass casualties in buildings or portions of buildings owned, leased, privatized, or otherwise occupied, managed, or controlled by or for the DoD (DoD 2003). These standards provide appropriate, implementable, and enforceable measures to establish a level of protection against terrorist attacks. The intent of these standards is achieved through prudent planning, real estate acquisition, and design and construction practices; these standards apply to new facilities and to existing facilities when undergoing major investments, conversion of use, building additions, or glazing replacement. As required by NEPA, the potential impacts of the Proposed Action on the human and natural environment must be evaluated, and reasonable alternatives to the Proposed Action must be considered.

356 2.2 Proposed Action

The Proposed Action (Project WWYK093003) consists of the construction of a new 7,448 square foot, 11-story ATCT at Tinker AFB meeting current USAF standards (Figure 2-1). The construction would include reinforced concrete, drilled piers, a foundation and floor slab, supporting superstructure, an elevator, fire protection systems, back-up power, lightning protection, utilities, communications support, site preparation and drainage, access road and turn around area, and other necessary support for a complete and useable facility. In addition, a stand-alone tornado shelter would be located outside the base of the tower. The total construction footprint, including parking and access road, is estimated to be 16,300 square feet.

365 The overall height of the new ATCT including the cab and antennas would be approximately
366 140 feet above ground level (AGL). This equates to an 11-story tower structure plus a tower cab
367 (ten floors at 10 feet, 6 inches; one mechanical floor at 15 feet; and one tower cab and
368 accompanying antennas at 20 feet). The elevation of the functional work surface in the new
369 ATCT's cab would be 120 feet AGL, which would satisfy architectural requirements and ensure
370 adequate depth perception. Under the guidance set forth in UFC 3-260-01, Control Towers are
371



EA

FIGURE
2-1

373 permissible deviations to the Airfield Siting Criteria as long as the tower is not a controlling
374 obstacle for a missed approach. This height is necessary to provide adequate visibility for
375 taxiways/runways, provide minimum angle requirements for depth perception to the furthest
376 aircraft traffic surface on the airdrome, and provide necessary equipment, training, briefing, and
377 administrative space. The control tower would be designed using the U.S. Air Force *Design*
378 *Guide for Air Traffic Control Towers* as a baseline document and would conform to the
379 requirements of Military Handbook (MIL HDBK) 1190, *Facility Planning and Design Guide*,
380 and MIL HDBK 1008C, *Fire Protection for Facilities* (USAF 2001b).

381 The floor designation is as follows:

382 **Table 2-1 Floor Designated Use for the Proposed ATCT**

Floor	Designated Use
First Floor	Telephone Distribution, Mechanical Yard
Second Floor	Administrative Office
Third Floor	Chief Standards Evaluation/Chief ATC Training Office
Fourth Floor	Chief Controller Office
Fifth Floor	Training Room
Sixth Floor	Briefing Room
Seventh Floor	Tower Simulator Room
Eighth Floor	Lower Electronics Equipment Room
Ninth Floor	Upper Electronics Equipment Room
Tenth Floor	Break/Ready Room
Eleventh Floor	Transfer Level
Top Floor	Control Tower Cab

383 Note: With the exception of the Control Tower Cab, Mechanical Room, and Equipment Rooms, other floor
384 designations may be exchanged to meet operational needs.

385 The Proposed Action would include the establishment of 24 parking spaces. An existing, active
386 taxiway would be converted for use for vehicles accessing the proposed tower; an access drive
387 would be constructed between the existing taxiway and the new parking area.

388 Electrical power would be 120/208, 60 Hertz (Hz), plus or minus 10 percent. A 120-140
389 kilovolt-Amperes (kVA) back-up generator with auto change-over and uninterruptible power
390 supply (UPS) for all technical power requirements would be included. An equipotential
391 grounding system would be installed in the control tower cab, simulator room, and the two
392 equipment rooms in accordance with Military Standard 188-124B.

393 An airfield lighting control panel, connected to the airfield lighting vault, would be required for
394 the new ATCT. The size, configuration, and location of the panel would be in accordance with
395 FAA Advisory Circular No. 150/5345-3D, Specifications for L821 panels for remote control of
396 airport lighting (8 August 1986). The current fiber optic controlled lighting control panel and
397 associated controls would be relocated to the new control tower.

398 All existing communication lines/circuitry for Navigational Aid (NAVAID) monitors and radio
399 transmitters/receivers terminating in the existing tower would be relocated to the new ATCT.
400 The existing base duct system for field lighting cables, primary power cables, control cables,
401 telephone cables, and meteorological cables would be relocated in the area of the proposed
402 ATCT. Existing cables within the construction zone would need to be field-verified and
403 relocated subsequent to ground-breaking for the new complex.

404 Once the new ATCT is constructed, programming action would be initiated by the base
405 Communications Squadron to relocate electronics equipment from the old control tower to the
406 new facility. Additionally, simulator equipment and activity would be moved from the existing
407 building to the new ATCT. The Communications Squadron would make arrangements to obtain
408 the Transportable-Enhanced Terminal Voice Switch (T-ETVS). The T-ETVS will allow “hot-
409 cutover” of the existing voice switch from the old facility to the new, eliminating the need to
410 procure a replacement switch.

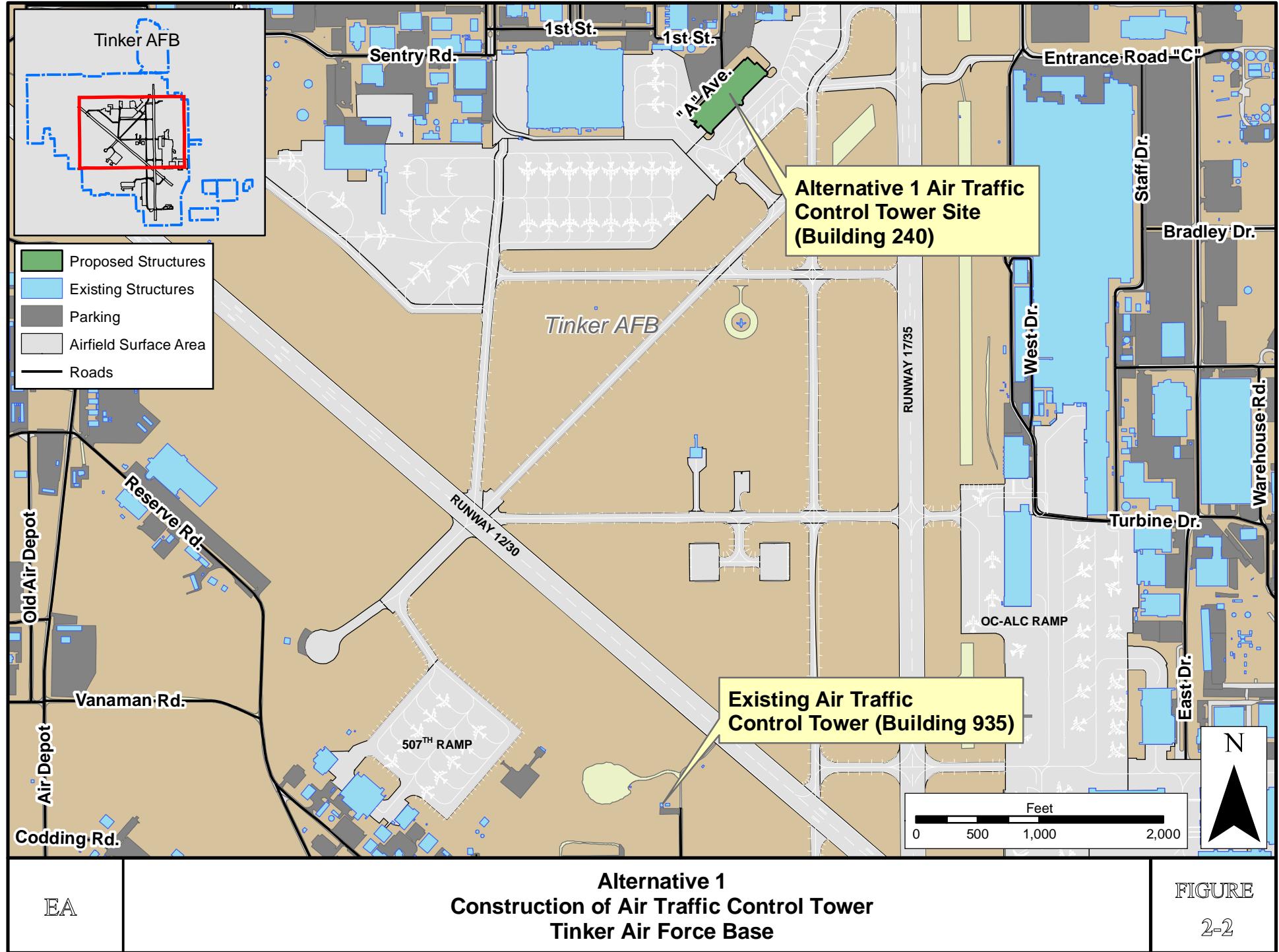
411 Upon completion of the new tower construction and cut-over (i.e., ATC operations
412 commencement), the existing tower would be dismantled. This would include the demolition of
413 the existing control tower (Building 935), parking lot, and access road (27,620 square feet). The
414 existing stand-alone tornado shelter and simulator building would be either moved to another
415 location(s) or demolished. The existing tower site would be converted to grass.

416 **2.3 Alternatives**

417 Alternative locations for the new ATCT were evaluated. Four alternatives to the Proposed
418 Action were identified, including the No-Action Alternative. Each alternative's adequacy for
419 implementing the project's objectives was evaluated and a summary of those evaluations are
420 provided below.

421 **2.3.1 Alternative 1: Alternative Siting for ATCT**

422 Implementation of Alternative 1 would involve remodeling Building 240 to include the proposed
423 ATCT (Figure 2-2). The location would provide adequate visibility of all airfield movement
424 areas except the munitions ramp, which is not currently visible. In addition, siting the ATCT in
425 this location would allow the aircraft traffic pattern to remain in a standard configuration,
426 passing in front of the controllers. However, Building 240, constructed in 1942, is eligible for
427 consideration as an historic building. Compliant with CEQ requirements, Alternative 1 will be
428 carried forward and effects of implementing this alternative will be further evaluated.



430 **2.3.2 Alternative 2: No-Action Alternative**

431 Under the No-Action Alternative, Tinker AFB would not implement the Proposed Action, and
432 current inefficiencies associated with overcrowded conditions in the tower cab would continue.
433 These overcrowded conditions jeopardize flying safety and delay flying operations. Extensive
434 building maintenance requirements would persist, and the ATCT would continue to operate in an
435 area that violates USAF siting criteria.

436 Although this alternative would not fulfill the purpose and need of the Proposed Action, this
437 alternative will be carried forward as required by the CEQ, which stipulates that the No-Action
438 Alternative must be considered to assess environmental consequences that may occur if the
439 Proposed Action is not implemented.

440 **2.3.3 Alternatives Considered but Eliminated and Not Carried Forward**

441 Two additional alternatives were identified but eliminated from further consideration. The first
442 eliminated alternative entails building a modern, adequately sized ATCT at the existing ATCT
443 site. The location would ultimately provide adequate visibility of all airfield surfaces; however,
444 the tower, as currently sited, violates USAF siting criteria because it is less than 1,000 feet from
445 the runway centerline. If the existing site were chosen as the location for construction of a new
446 tower, the existing tower would need to be dismantled, and the use of a mobile tower would be
447 required during construction. Utilization of a mobile tower as an interim facility would
448 significantly impact wing flying operations due to limited space, equipment, and airfield
449 visibility. In addition, construction requirements of this alternative would be located within the
450 100-year floodplain. Furthermore, the existing ATCT location has been identified for more
451 suitable and compatible airfield uses, including future runway expansion and ramp construction
452 projects. Therefore, this alternative was eliminated from further analysis.

453 The second alternative considered but eliminated involves constructing the proposed ATCT in an
454 area east of Runway 17/35, midfield, adjacent to the OC-ALC complex (Figure 2-2), on the ALC
455 side of Building 3102. The location would provide adequate visibility of all airfield surfaces;
456 however, given the dense Air Depot ramp and parking space and the limited real estate available
457 in the area, utilities (e.g., water, sewer, electrical, and telephone) would need to be installed to
458 support construction and operation of the tower on this parcel. Siting the ATCT in this location
459 would place the aircraft traffic pattern behind the controller in a non-standard configuration,
460 potentially causing flight safety issues and requiring the relocation of operations to the west side
461 of the airfield to allow the observation of the flight pattern in front of the controllers. This
462 relocation would, in turn, place the aircraft flight path closer to Oklahoma City and to Will
463 Rogers International Airport. For these reasons, this alternative was eliminated from further
464 analysis.

465 **2.4 Reasonably Foreseeable Concurrent Actions**

466 Implementation of the Proposed Action and associated potential environmental impacts would
467 occur concurrently with other projects and developments proposed on Tinker AFB, and in the
468 vicinity of the base. In addition to the Proposed Action, projected projects on Tinker AFB for
469 the next five years include:

470 • Depot Maintenance and Reengineering Transformation (DMRT) Three-Bay Hangar
471 Construction;

472 • Construct Consolidated Fuel and Overhaul Facility;

473 • Military Family Housing Privatization;

474 • Relocation of 137 Airlift Wing of Air National Guard;

475 • Transfer 939 Air Reserve Wing aircraft to Tinker AFB;

476 • Defense Logistics Agency (DLA) Warehouse Construction;

477 • Construction of Medical Clinic;

478 • Child Development Center Construction;

479 • T-10 hush house (B926), B3234 Test Cell Facility, and B3772;

480 • Tinker Aerospace Complex (TAC);

481 • Harry Twaddle Acquisition;

482 • Construct Consolidated Wing Headquarters Facility;

483 • Physical Fitness Center Construction;

484 • Consolidated Security Forces, South 40 Development;

485 • Realignment of Air Depot Road/Tinker Gate; and

486 • Phase III, 3rd Combat Communications Complex Construction.

487

488 The projects listed above and their associated cumulative impacts are further discussed and
489 analyzed in *Section 5, Cumulative Impacts*.

490 **2.5 Summary of Potential Impacts**

491 Potential impacts were evaluated and are described in Section 4, Environmental Consequences.
492 Table 2-2 provides a summary of the potential impacts for resource areas fully evaluated and
493 associated with the Proposed Action, Alternative 1, and the No Action Alternative. Table 2-3
494 provides a summary of resource areas that were not evaluated further due to no impacts to those
495 resources from the Proposed Action, Alternative 1, and the No Action Alternative.

496

Table 2-2 Summary of Impacts for Fully Evaluated Resources

Resource/ Issue	Proposed Action	Alternative 1	No Action Alternative
Air Quality	<p>Increased PM₁₀ emissions resulting from proposed construction activities would comprise short-term adverse impacts that could be mitigated through standard dust minimization practices. After initial site preparation and grading activities are completed, dust emissions would be significantly less, and once operational, long-term emissions from developed facilities would be negligible. Given that the proposed ATCT would house similar equipment currently in use in the existing ATCT, no new equipment that would have substantial emissions would be introduced.</p> <p>Emissions generated by implementation of the Proposed Action are expected to be below <i>de minimis</i> levels.</p>	<p>Implementation of Alternative 1 would result in similar impacts as the Proposed Action because the acreage for the Alternative 1 ATCT footprint, parking area, and construction staging area would be the same. However, since the new access road to the tower would be shorter in length than that of the Proposed Action, impacts to air quality would be expected to be below <i>de minimis</i> levels.</p>	<p>Conditions would remain as described in <i>Section 3.1, Air Quality</i>.</p>
Water Resources	<p>Contaminants, such as petroleum hydrocarbons, in run-off from developed areas of the site, including industrial areas or parking lots, could impact water quality in the area. These impacts would be minimized assuming existing non-point source pollution requirements are met and spill prevention and response procedures are implemented at the site.</p> <p>Furthermore, implementation of best management practices (BMPs) – such as silt fencing, berm construction around construction sites, etc. – would minimize this potential to negligible impacts during construction. Over the long-term, no operations that would affect surface water are anticipated to occur. The Proposed Action site does not overlie any known groundwater contamination. It is unlikely that groundwater quality would adversely affect or be affected by constructing a</p>	<p>Implementation of Alternative 1 would result in a potential increase for soil erosion during construction and the release of contaminants (i.e., petroleum hydrocarbons) in runoff from developed areas of the site, which could result in possible adverse impacts on water quality. BMPs would be implemented to minimize the potential for soil erosion during construction and the release of contaminants.</p>	<p>Conditions would remain as described in <i>Section 3.2, Water Resources</i>. The existing ATCT would continue to operate in the floodplain.</p>

498

Table 2-2 Summary of Impacts for Fully Evaluated Resources (Continued)

Resource/ Issue	Proposed Action	Alternative 1	No Action Alternative
	<p>new facility on this site assuming required controls for the handling of hazardous materials and for spill prevention and cleanup are implemented to protect groundwater. Implementation of the Proposed Action would not eliminate or modify any existing wetlands on Tinker AFB. No 100-year or 500-year floodplains have been identified on the proposed project site. However, since the current ATCT facility is located in a designated 100-year floodplain, removal of the current ATCT facility would add permeable surface back to the existing floodplain.</p>		
Biological Resources	<p>Implementation of the Proposed Action would require the removal of vegetation on the property. The existing ATCT and parking lot footprints would be converted to grass. Indirect impacts to biological resources would be negligible on a regional scale.</p>	<p>Implementation of Alternative 1 would not require the removal of vegetation on the property. The existing ATCT and parking lot footprints would be converted to grass. Indirect impacts to biological resources would be negligible on a regional scale.</p>	<p>Conditions would remain as described in <i>Section 3.3, Biological Resources</i>.</p>
Transportation and Circulation	<p>Implementation of the Proposed Action would re-route current ATCT personnel's commuting traffic. The proposed route would lead southeast from "A" Avenue between buildings 230 and 240 to the taxiway leading to the new ATCT. The proposed parking area would accommodate personnel. Implementation of the Proposed Action would not increase traffic but redirect circulation to a different part of the base. Furthermore, increases in traffic volumes associated with construction activity would be short-term; upon completion of construction, no long-term impacts to transportation systems would result.</p>	<p>Implementation of Alternative 1 would redirect current ATCT personnel's commuting traffic. The alternative route would involve driving and parking at Building 240 in the existing parking lot. Currently, traffic in this portion of the base is heavy; therefore, implementation of Alternative 1 could increase traffic and circulation problems in this part of the base. Furthermore, increases in traffic volumes associated with construction activity would be short-term; upon completion of construction, minimal impacts to transportation systems would result.</p>	<p>Conditions would remain as described in <i>Section 3.4, Transportation and Circulation</i>.</p>

499

Table 2-2. Summary of Impacts for Fully Evaluated Resources (Continued)

Resource/ Issue	Proposed Action	Alternative 1	No Action Alternative
Cultural Resources	No National Register of Historic Places (NRHP) - listed or eligible archaeological resources have been recorded on the site, and no known federally recognized Native American lands or resources are located at Tinker AFB. If such resources were encountered or identified during project implementation, activities would be suspended and the Oklahoma State Historic Preservation Office (SHPO) would be consulted to determine the significance of the resource(s).	Building 240 is eligible for historic listing since its construction occurred in 1942. Remodeling B240 would impact cultural resources.	Conditions would remain the same as existing conditions.
Hazardous Materials and Wastes	An increase in the volume of hazardous wastes generated could occur during the demolition of the existing ATCT facility. However, the increased volume would be temporary and accommodated within the existing framework of the management, handling, or disposal processes. Only negligible impacts involving hazardous wastes would occur as a result of this alternative.	Impacts resulting from the implementation of Alternative 1 would be the same as the Proposed Action; an increase in the volume of hazardous wastes generated could occur during the demolition of the existing ATCT. However, the increased volume would be temporary and accommodated within the existing framework of the management, handling, or disposal processes. A diesel-powered generator would be on-site to provide back-up power. However, no hazardous materials would be stored on-site since no external fuel storage tank would be installed. Only negligible impacts involving hazardous wastes would occur as a result of this alternative.	Conditions would remain as described in <i>Section 3.5, Hazardous Materials and Wastes</i> .
Visual Resources	Changes to visual resources associated with the Proposed Action would include the construction of an ATCT facility and small parking area and the demolition of the existing ATCT. The existing ATCT site will be allowed to revert back to grass similar to the rest of the airfield. The visual environment of Tinker AFB does not constitute a unique or sensitive viewshed, and no detrimental impact to local or	Changes to visual resources associated with Alternative 1 would include the remodeling of B240 to include an ATCT facility and the demolition of the existing ATCT. The existing ATCT site will be allowed to revert back to grass similar to the rest of the airfield. The visual environment of Tinker AFB does not constitute a unique or sensitive viewshed, and no detrimental impact to local or	Conditions would remain the same as existing conditions.

500

Table 2-2. Summary of Impacts for Fully Evaluated Resources (Continued)

Resource/ Issue	Proposed Action	Alternative 1	No Action Alternative
	local or regional visual resources would occur upon implementation of the Proposed Action. Development of the new ATCT would be consistent and compatible with the visual characteristics of the airfield environment.	regional visual resources would occur upon implementation of this Alternative.	
Safety	Implementation of the Proposed Action would benefit the safety of flying operations at Tinker AFB and the surrounding communities by improving currently unsuitable airborne and ground aircraft traffic control conditions.	Potential impacts to safety under Implementation of Alternative I would be similar to those occur under the Proposed Action and would include improving currently unsuitable airborne and ground aircraft traffic control conditions. However, there is limited parking space available in the vicinity of B240 and vehicle traffic congestion may increase. Because of increased traffic congestion, minimal adverse impacts to safety may occur.	Conditions would remain the same as existing conditions. Flight safety, as well as taxiing aircraft or vehicle movement on airfield surfaces would remain significantly impaired
Noise and Vibration	Implementation of the Proposed Action would generate short-term construction noise and long-term operational noise resulting from use of the back-up generator. This noise generation would not result in notable changes in airfield noise contours and would be consistent with the existing surrounding noise environment. However, current noise at the proposed site is 75 to 80 Day-Night Average Sound Level (L_{dn}); therefore, noise reduction will be required within the ATCT. Noise and vibration originating from operations the T-10 hush house located near the Proposed Action site were evaluated to determine if they would be compatible with the proposed ATCT. These uses were found to be consistent. Negligible noise impacts would result from implementation of the Proposed Action.	Impacts of Alternative 1 would be identical to the Proposed Action. Implementation of Alternative 1 would not result in changes in noise contours. Negligible noise impacts would result from implementation of this alternative. The T-10 hush house is farther from the Alternative 1 site; therefore, operation of the T-10 hush house would not interfere with operation of an ATCT at the Alternative 1 site.	Conditions would remain the same as existing conditions.

501

502

Table 2-3. Summary of No Impact for Resources Not Evaluated Further

Resource/ Issue	Proposed Actions	Alternative 1	No Action Alternative
Land Use	Since implementation of the Proposed Action would not require changes to land use designations or be considered incompatible with the Tinker AFB General Plan and Oklahoma City Southeast Sector Plan, implementation of the Proposed Action would not result in land use incompatibility or inconsistency in the vicinity of Tinker AFB.	Since implementation of Alternative 1 would not result in changes in land use compatibility, implementation of this alternative would not result in land use incompatibility in the vicinity of Tinker AFB.	Conditions would remain the same as existing conditions.
Geological Resources	Implementation of the Proposed Action would require grading, and site preparation would be required to support the building and parking area. Negligible impacts would result from implementation of the Proposed Action.	Implementation of Alternative I would involve remodeling an existing building, and would not require any grading, site preparation, or other significant ground-disturbing activity to support the building and parking area. Therefore, implementation of this alternative would not result in impacts to geological resources.	Conditions would remain the same as existing conditions.
Socioeconomics	Implementation of the Proposed Action would not increase or decrease the number of personnel at Tinker AFB; therefore, socioeconomic impacts would not result.	Implementation of Alternative 1 would not increase or decrease the number of personnel at Tinker AFB; therefore, socioeconomic impacts would not result.	Conditions would remain the same as existing conditions.
Environmental Justice and Protection of Children	Only minimal impacts would result from implementation of the Proposed Action; therefore, minority and low-income populations would not be disproportionately adversely impacted. Similarly, the Proposed Action would not cause adverse impacts in areas supporting or frequented by concentrated populations of children. Therefore, negligible impacts with regard to environmental justice or protection of children would occur with implementation of the Proposed Action.	Only minimal impacts would result from implementation of Alternative 1; therefore, minority and low-income populations would not be disproportionately adversely impacted. Similarly, Alternative 1 would not cause adverse impacts in areas supporting or frequented by concentrated populations of children. Therefore, only negligible impacts with regard to environmental justice or protection of children would occur with implementation of this alternative.	Conditions would remain the same as existing conditions.

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SECTION 3 AFFECTED ENVIRONMENT

506 This section describes relevant existing environmental conditions for resources potentially
507 affected by implementation of the Proposed Action and identified alternatives. In compliance
508 with NEPA, CEQ regulations, UFC 3 260-01, and 32 CFR 989, the description of the affected
509 environment focuses on only those aspects potentially subject to impacts (AFCESA 2006).

510 In the case of the Proposed Action, the affected environment description is limited primarily to
511 Tinker AFB and Oklahoma County. Resource descriptions focus on the following areas: air
512 quality, water resources, biological resources, transportation and circulation, cultural resources,
513 hazardous materials and wastes, visual resources, and safety.

514 3.1 Air Quality

515 3.1.1 Definition of Resource

516 Air quality in a given location is determined by the concentration of various pollutants in the
517 atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the US
518 Environmental Protection Agency (USEPA) under the Clean Air Act (CAA) for criteria
519 pollutants, including: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide
520 (SO_2), particulate matter equal to or less than 10 microns in diameter (PM_{10}) and 2.5 microns in
521 diameter ($PM_{2.5}$), and lead (Pb). NAAQS represent maximum levels of background pollution
522 that are considered safe, with an adequate margin of safety, to protect public health and welfare.

523 3.1.1.1 Criteria Pollutants

524 Air quality is affected by emissions from stationary sources (e.g., industrial development) and
525 mobile sources (e.g., motor vehicles). Air quality at a given location is a function of several
526 factors, including the quantity and type of pollutants emitted locally and regionally, and the
527 dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are
528 wind speed and direction, atmospheric stability, temperature, the presence or absence of
529 inversions, and topography.

530 **Ozone.** The majority of ground-level (terrestrial) O_3 is formed as a result of complex
531 photochemical reactions in the atmosphere involving volatile organic compounds (VOCs),
532 nitrogen oxides (NO_x), and oxygen. O_3 is a highly reactive gas that damages lung tissue, reduces
533 lung function, and sensitizes the lung to other irritants. Although stratospheric O_3 shields the
534 earth from damaging ultraviolet radiation, terrestrial O_3 is a highly damaging air pollutant and is
535 the primary source of smog. As of June 2004, USEPA issued the final rule for 8-hour O_3 ,
536 revising the 1-hour O_3 NAAQS standard. The 8-hour standard is more protective of public
537 health and more stringent than the 1-hour standard, and non-attainment areas for 8-hour O_3 are
538 now designated.

539 **Carbon Monoxide.** CO is a colorless, odorless, poisonous gas produced by incomplete burning
540 of carbon in fuel. The health threat from CO is most serious for those who suffer from
541 cardiovascular disease, particularly those with angina and peripheral vascular disease.

542 **Nitrogen Dioxide.** NO₂ is a highly reactive gas that can irritate the lungs, cause bronchitis and
543 pneumonia, and lower resistance to respiratory infections. Repeated exposure to high
544 concentrations of NO₂ may cause acute respiratory disease in children. Because NO₂ is an
545 important precursor in the formation of O₃ or smog, control of NO₂ emissions is an important
546 component of overall pollution reduction strategies. The two primary sources of NO₂ in the US
547 are fuel combustion and transportation.

548 **Sulfur Dioxide.** SO₂ is emitted primarily from stationary source coal and oil combustion, steel
549 mills, refineries, pulp and paper mills, and from non-ferrous smelters. High concentrations of
550 SO₂ may aggravate existing respiratory and cardiovascular disease; asthmatics and those with
551 emphysema or bronchitis are the most sensitive to SO₂ exposure. SO₂ also contributes to acid
552 rain, which can lead to the acidification of lakes and streams and damage trees.

553 **Particulate Matter (PM₁₀ and PM_{2.5}).** PM is a mixture of tiny particles that vary greatly in
554 shape, size, and chemical composition, and can be comprised of metals, soot, soil, and dust.
555 PM₁₀ includes larger, coarse particles, whereas PM_{2.5} includes smaller, fine particles. Sources of
556 coarse particles include crushing or grinding operations, and dust from paved or unpaved roads.
557 Sources of fine particles include all types of combustion activities (e.g., motor vehicles, power
558 plants, wood burning) and certain industrial processes. Exposure to PM₁₀ and PM_{2.5} levels
559 exceeding current standards can result in increased lung- and heart-related respiratory illness.
560 USEPA has concluded that finer particles are more likely to contribute to health problems than
561 those greater than 10 microns in diameter.

562 **Airborne Lead (Pb).** Airborne Pb can be inhaled directly or ingested indirectly by consuming
563 lead-contaminated food, water, or non-food materials such as dust or soil. Fetuses, infants, and
564 children are most sensitive to Pb exposure, which has been identified as a factor in high blood
565 pressure and heart disease. Exposure to Pb has declined dramatically in the last 10 years as a
566 result of the reduction of Pb in gasoline and paint, and the elimination of Pb from soldered cans.

567 **3.1.1.2 Clean Air Act Amendments**

568 The Clean Air Act Amendments (CAA) of 1990 place most of the responsibility to achieve
569 compliance with NAAQS on individual states. To this end, USEPA requires each state to
570 prepare a State Implementation Plan (SIP). A SIP is a compilation of goals, strategies,
571 schedules, and enforcement actions that will lead the state into compliance with all NAAQS.
572 Areas not in compliance with a standard can be declared nonattainment areas by USEPA or the
573 appropriate state or local agency. In order to reach attainment status, NAAQS may not be
574 exceeded more than once per year. A nonattainment area can reach attainment when NAAQS
575 have been met for a period of ten consecutive years. During this time period the area is in
576 transitional attainment, also termed maintenance.

577 **3.1.2 Existing Conditions**

578 **3.1.2.1 Climate**

579 Oklahoma County is located in the Interior Lowlands physiographic region. The County has two
580 major land resource areas (MLRA): the eastern half of the county is in the Northern Cross
581 Timbers MLRA and the western half is in the Central Rolling Red Prairies MLRA (U.S.
582 Department of Agriculture [USDA] 2003). In winter, the average daily temperature is 38.6
583 degrees Fahrenheit ($^{\circ}$ F), and the average daily minimum temperature is 27.8 $^{\circ}$ F. In summer the
584 average temperature is 80 $^{\circ}$ F, and the average daily maximum temperature is 91.1 $^{\circ}$ F. The
585 average annual precipitation is 33.35 inches. The majority of precipitation, 74 percent, usually
586 falls from April through October; average seasonal snowfall is 9.1 inches. Prevailing winds
587 blow from the south with the average speed of 14 miles per hour in March and April
588 (USDA 2003).

589 **3.1.2.2 Local Air Quality**

590 Oklahoma County is currently designated by the USEPA as an attainment area for carbon
591 monoxide, sulfur dioxide and particulate matter (PM₁₀ and PM_{2.5}). A five-year Ozone Early
592 Action Compact for Oklahoma City was initiated and has been completed. During that time,
593 Oklahoma City never required a nonattainment deferral from the USEPA. Currently the
594 Association of Central Oklahoma Governments is developing an 8-hour ozone flex plan for
595 Oklahoma City for the next five years, similar to the Early Action Compact. Ten air quality
596 monitoring stations are located within Oklahoma County, including one CO monitoring station,
597 one PM₁₀ monitoring station, two PM_{2.5} monitoring stations, one SO₂ monitoring station, three
598 ozone monitoring stations, and two NO₂ monitoring stations. According to USEPA AirData,
599 concentrations of PM₁₀, PM_{2.5}, NO₂, and CO have not exceeded the primary NAAQS during the
600 past 10 years (USEPA 2007). According to USEPA AirData, concentrations of ozone have
601 exceeded the 8-hour NAAQS in the past 10 years (USEPA 2007). In addition to criteria
602 pollutants, the Oklahoma Department of Environmental Quality (DEQ) Air Quality Division
603 regulates incinerators, particulate matter, cotton gins, smoke, and odors (DEQ 2006a).

604 **3.1.2.3 Tinker AFB and Proposed Project Location**

605 DEQ – which publishes regulations for air quality and permitting for all counties in Oklahoma –
606 has jurisdiction over and regulates air emissions associated with Tinker AFB. Tinker AFB is
607 located within Oklahoma County, which is in an Early Action Compact Agreement with USEPA
608 for 8-hour ozone and in attainment for all other criteria pollutants.

609 Under the CAAA, the Title V Operating Permit Program imposes requirements for air quality
610 permitting on air emission sources. Tinker AFB is categorized as a major source under the Title
611 V program since its potential emissions from stationary sources exceed 100 tons per year (tpy) of
612 any of the criteria pollutants, or 10 tpy of any single Hazardous Air Pollutant (HAP), or 25 tpy of
613 any combination of HAPs. Also under the CAAA, the National Emission Standards for

614 Hazardous Air Pollutants (NESHAP) program specifies various provisions for regulated sources,
615 including limits on HAP emissions, compliance demonstrations and performance testing,
616 monitoring, record keeping, and reporting. The NESHAP program applies to Tinker AFB since
617 potential emissions of any single HAP equals or exceeds 10 tpy and a combination of HAPs
618 equals or exceeds 25 tpy. Tinker AFB maintains a Title V Air Permit (DEQ 2006b). Primary
619 on-site emission sources at the Tinker AFB include:

- 620 • stationary combustion sources (boilers, water heaters, furnaces, gasoline and diesel-fuel
621 generators, engine test cells);
- 622 • operational sources (chemical usage, paints, degreasers, abrasive blasting, welding
623 operations, fuel cell maintenance, wastewater treatment, small arms firing range);
- 624 • fuel-storage/transfer operations (horizontal tanks, internal floating roof tanks); and
- 625 • mobile sources (vehicle operations, aircraft operations, trim and power checks, aerospace
626 ground equipment [AGE]).

627 The proposed ATCT facility would be developed on property located in the general area of the
628 existing Engine Hushhouse, B926, north of the existing Control Tower, in proximity to midfield.
629 This location is approximately 1,750 feet west of the Runway 17/35 centerline and 7,500 feet
630 east of the Runway 17 threshold. No activities or development occur on or adjacent to this
631 property that generate emissions uncharacteristic of the base or regional environment.

632 **3.2 Water Resources**

633 **3.2.1 Definition of Resource**

634 Water resources analyzed in this EA include surface and groundwater resources, including the
635 quality and availability of surface and groundwater, wetlands, and the potential for flooding.
636 Surface water resources include lakes, rivers, and streams and are important for a variety of
637 reasons including economic, ecological, recreational, and human health. Groundwater includes
638 the subsurface hydrologic resources of the physical environment and is an essential resource in
639 many areas; groundwater is commonly used for potable water consumption, agricultural
640 irrigation, and industrial applications. Groundwater properties are often described in terms of
641 depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition.

642 Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and USEPA as “those
643 areas that are inundated or saturated by surface or groundwater at a frequency and duration
644 sufficient to support, and that under normal circumstances do support, a prevalence of vegetation
645 typically adapted for life in saturated soil conditions. As defined in 1984, wetlands generally
646 include swamps, marshes, bogs, and similar areas” (33 CFR 328.3 [b]). Wetlands provide a
647 variety of functions including groundwater recharge and discharge, flood flow alteration,
648 sediment stabilization, sediment and toxicant retention, nutrient removal and transformation,
649 aquatic and terrestrial diversity and abundance, and uniqueness. Three criteria are necessary to
650 define wetlands: vegetation (hydrophytes), soils (hydric), and hydrology (frequency of flooding

651 or soil saturation). *Hydrophytic vegetation* is classified by the estimated probability of
652 occurrence in wetland versus upland (non-wetland) areas throughout its distribution. *Hydric*
653 *soils* are those that are saturated, flooded, or ponded for sufficient periods during the growing
654 season and that develop anaerobic conditions in their upper horizons (i.e., layers). Wetland
655 hydrology is determined by the frequency and duration of inundation and soil saturation;
656 permanent or periodic water inundation or soil saturation is considered a significant force in
657 wetland establishment and proliferation. Jurisdictional wetlands are those subject to regulatory
658 authority under Section 404 of the Clean Water Act (CWA); Executive Order (EO) 11990,
659 *Protection of Wetlands*, requires analyses of potential impacts to wetlands related to proposed
660 federal actions.

661 Other issues relevant to water resources include watershed areas affected by existing and
662 potential runoff and hazards associated with 100-year floodplains. Floodplains are belts of low,
663 level ground present on one or both sides of a stream channel and are subject to either periodic or
664 infrequent inundation by flood water. Inundation dangers associated with floodplains have
665 prompted federal, state, and local legislation that limits development in these areas largely to
666 recreation and preservation activities. EO 11988, *Floodplains Management*, requires actions to
667 minimize flood risks and impacts. Under this order, development alternatives must be
668 considered and building requirements must be in accordance with specific federal, state and local
669 floodplain regulations.

670 **3.2.2 Existing Conditions**

671 **3.2.2.1 Regional Setting**

672 **Surface Water**

673 Oklahoma County's landforms drain into the North Canadian River. The northern portion of the
674 County drains into the Crutcho Creek Drainage Basin and into the North Canadian River, and the
675 southern portion drains into the Elm Creek and Hog Creek Drainage Basins and into the South
676 Canadian River, both of which are headwaters for the Arkansas-Mississippi River Basin. The
677 North Canadian River runs west to east through Oklahoma County. The entire County is part of
678 the Arkansas River Basin (U.S. Fish and Wildlife Service [USFWS] 2006a).

679 Several drainage corridors traverse Oklahoma County close to Tinker AFB, including Brock
680 Creek, East Elm Creek, Crutcho Creek, West Hog Creek, East and West Forks of Wildhorse
681 Creek, Bluff Creek, Walnut Creek, and Soldier Creek. Surface waters occur in three main
682 stream systems, one which drains to the north (Crutcho Creek with Kuhlman and Soldier Creek
683 tributaries) and two to the south (East Elm Creek and West Hog Creek). The north-flowing
684 stream system originates approximately two miles south of Tinker AFB's current southern
685 boundary with on-base portions of the system comprising 12 smaller, first-order tributaries; two
686 larger, second-order tributaries; and one main, third-order tributary. The south-flowing systems
687 consist of only first- and second-order tributaries with higher-order tributaries located off base

688 land. Several other minor creeks and draws feed into the above-mentioned major creeks
689 (Oklahoma Water Resources Board [OWRB] 2006).

690 **Groundwater**

691 Aquifers which underlie Oklahoma County include both ephemeral (short-lived) and perennial
692 (lasting the entire year) aquifers. The most important source of potable groundwater in the
693 Oklahoma City metropolitan area is the Central Oklahoma Aquifer system. This aquifer extends
694 under much of central Oklahoma and includes water in the Garber Sandstone and Wellington
695 Formation, the overlying alluvium and terrace deposits, and the underlying Chase, Council
696 Grove, and Admire Groups. The Garber Sandstone and the Wellington Formation portion of the
697 Central Oklahoma Aquifer system is referred to commonly as the "Garber-Wellington Aquifer"
698 and is considered to be a single aquifer because these units were deposited under similar
699 conditions. Many of the best producing water wells are completed in this zone. On a regional
700 scale, the aquifer is confined above by the less permeable Hennessey Group and below by the
701 Late Pennsylvanian Vanoss Group. The regional dip of these formations is generally to the west
702 (Parkhurst et al. 1993).

703 Tinker AFB lies within the recharge area of the Garber-Wellington Aquifer. The direction of the
704 regional water table gradient under Tinker AFB is reported to range generally from
705 west/northwest to southwest, depending on location, and has a magnitude ranging from 10 to 30
706 feet per mile (Christenson et al. 1992). However, determination of horizontal gradients is made
707 difficult by the presence of a downward component of flow in the Garber-Wellington Aquifer.
708 Both direction and magnitude of groundwater flow can be highly variable, both spatially and
709 temporally, due to local variations in geology, sources of recharge, and the interaction between
710 the shallow aquifer and streams. This aquifer is recharged primarily by infiltration of rainfall or
711 surface water through fractures in the Fairmont Shale and directly into the Garber Sandstone
712 (OWRB 2006).

713 Across the county, water can sometimes be found in shallow, thin, discontinuous perched zones
714 located above the aquifer. Most water from the Garber-Wellington aquifer is of sufficient quality
715 to be used for most industrial, agricultural, and domestic purposes.

716 Industrial operations, individual homes, farm irrigation, and small communities not served by a
717 municipal distribution system also depend on the Garber Wellington Aquifer. Communities
718 presently depending on surface supplies, such as Oklahoma City, Midwest City, and Del City,
719 maintain wells tapping the Garber-Wellington Aquifer as a backup water supply in the event of
720 drought.

721 **Wetlands**

722 Wetlands represent approximately two percent of the land area in Oklahoma (USEPA 2006).
723 Several wetlands are located in Oklahoma County; National Wetland Inventory (NWI) maps for
724 the area indicate that these wetlands are primarily freshwater emergent, freshwater
725 forested/shrub, freshwater pond, and riverine (USFWS 2006a).

726 **Floodplains**

727 Flood hazard areas of Oklahoma County are subject to periodic inundation which results in loss
728 of life and property, health and safety hazards, disruption of commerce and governmental
729 services, and extraordinary public expenditures for flood protection and relief, all of which
730 adversely affect public health, safety and general welfare. The bulk of Federal Emergency
731 Management Agency (FEMA) designated floodplains, 100-year and 500-year, for Oklahoma
732 County exist along the North Canadian River and its tributaries (OWRB 2006).

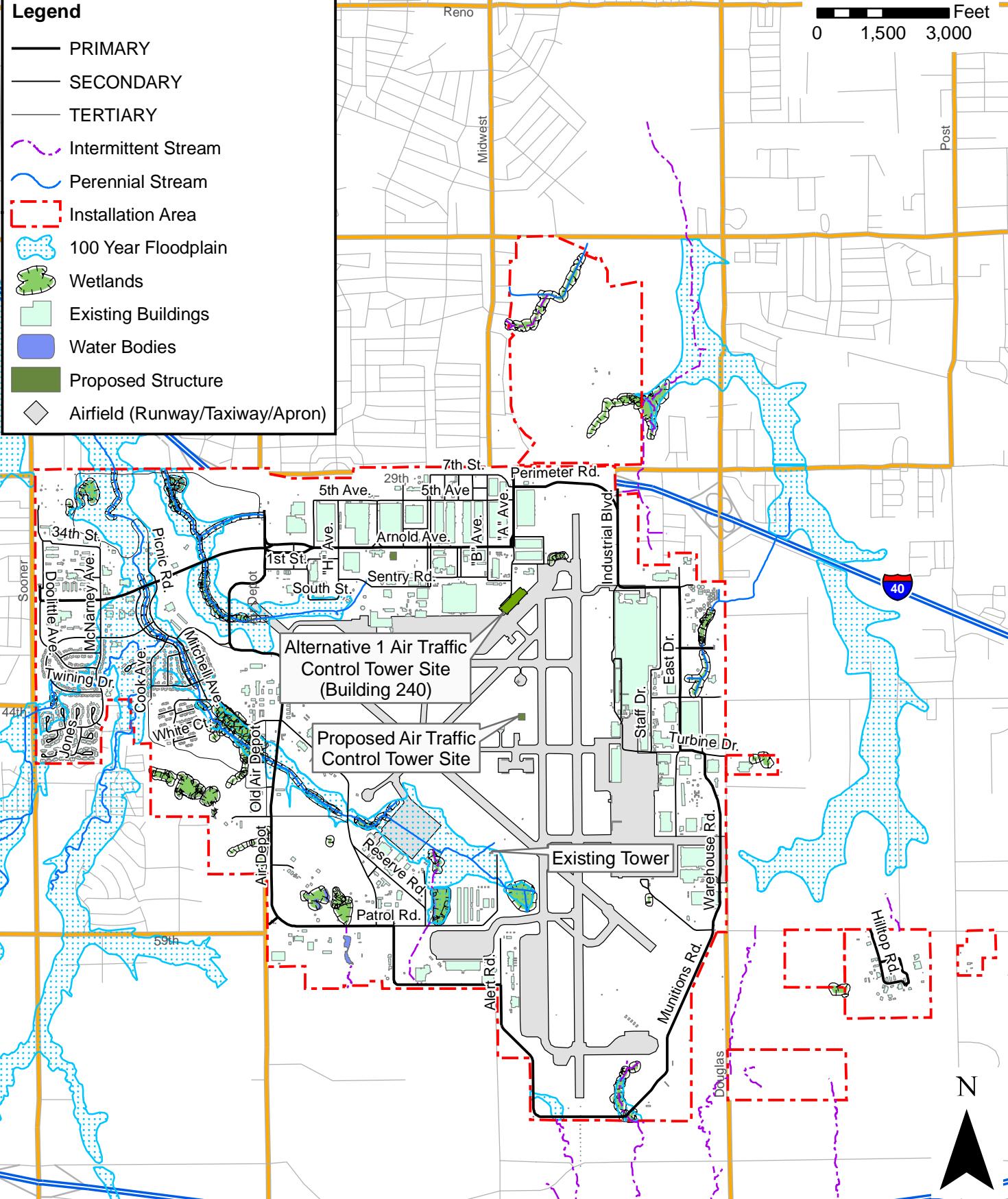
733 The Floodplain Board of Oklahoma County appoints a county floodplain manager who
734 administers and implements regulations and other appropriate sections of 44 CFR (National
735 Flood Insurance Program Regulations) pertaining to floodplain management. The duties and
736 responsibilities of the floodplain board are to adopt, administer and enforce floodplain
737 management regulations which: (a) delineate floodplains and floodways, and delineate 100-year
738 flood elevations within all unincorporated areas of the County (these delineations shall be
739 submitted to the OWRB); (b) preserve the capacity of the floodplain to carry and discharge
740 regional floods; (c) minimize flood hazards; and (d) regulate the use of land in the floodplain
741 (OWRB 2006).

742 **3.2.2.2 Tinker AFB and Proposed Project Location**

743 **Surface Water**

744 Surface drainage at Tinker AFB occurs in three primary drainage basins: 1) Crutcho Creek
745 Drainage Basin, 2) Elm Creek Drainage Basin, and 3) Hog Creek Drainage Basin. These are
746 further divided into 10 sub-basins or watersheds. The majority of land associated with Tinker
747 AFB is drained by the Crutcho Creek Drainage Basin which flows to the north into the North
748 Canadian River. The Elm Creek and Hog Creek Drainage Basins flow to the south of the base
749 into the Little River which forms confluences with the South Canadian River (Tinker
750 AFB 2007a).

751 On-base, open-flowing waters comprise a total of about eight linear miles. The first- and
752 second-order segments are typically ephemeral or intermittent while the third-order segment is
753 perennial. All base creek flows are the result of stormwater runoff (Tinker AFB 2007a).
754 Stormwater runoff is collected by various diversion structures and discharged to surface streams.
755 Approximately 5 miles of stream channels within Tinker AFB lie within 100-year floodplains
756 (Figure 3-1) (USAF 1991).



EA

**Wetlands, Waterbodies, and Floodplains
Construction of Air Traffic Control Tower
Tinker Air Force Base**

**FIGURE
3-1**

758 This action eliminated flows of 1.3 million gallons per day to the on-base portion of Soldier
759 Creek (i.e., East Soldier Creek) (Tinker AFB 2007a).

760 **Groundwater**

761 The direction of groundwater flow under Tinker AFB varies. There is an apparent groundwater
762 divide associated with Crutcho Creek that affects shallow groundwater flow direction. Regional
763 topographic lows draw portions of groundwater in the area southwestward, while other areas
764 flow northward toward discharge points along Crutcho Creek (Tinker AFB 2001).

765 Throughout much of the northern half of the base, the Garber-Wellington Aquifer is not
766 protected by any confining shale. In the southern half of the base, the Hennessey Group overlies
767 the Aquifer and acts as a confining layer because it is comprised predominately of clay-rich, low-
768 permeability shale. The confining nature of the Hennessey Group causes rainfall to remain near
769 ground surface and flow laterally until it discharges to streams. The groundwater system at
770 Tinker AFB has been divided into five hydrogeologic zones: the Hennessey Water Bearing Zone,
771 the Upper Saturated Zone (USZ), the Lower Saturated Zone (LSZ), the Lower-Lower Saturated
772 Zone (LLSZ), and the Production Zone (PZ). The USZ and LSZ are regionally considered to be
773 in the upper third of the Garber-Wellington Aquifer, and generally are present at depths of less
774 than 200 feet below ground surface (bgs). The LLSZ is considered the lower half of the LSZ.
775 The PZ generally is considered to be greater than 200-feet bgs. Generally, municipal wells are
776 completed below the 200 foot depth on and around Tinker AFB and are used for water supply at
777 Tinker AFB and off-base locations (Tinker AFB 2001). Tinker AFB is located in a recharge area
778 for these water-bearing zones; groundwater is derived primarily from precipitation and from
779 infiltration of surface streams.

780 Groundwater at Tinker AFB is found under either water table or confined conditions. The depth
781 to water ranges from a few feet to about 70 feet bgs depending on the local topography. Across
782 Tinker AFB, water can sometimes be found in shallow, thin, discontinuous perched zones
783 located above the Aquifer. However, some contaminated groundwater plumes do exist on Tinker
784 AFB, typically at a depth of 175 feet or shallower. This does not pose health concerns at this
785 time since the producing zone (i.e., depth at which water from supply wells is obtained) at Tinker
786 is 200 feet or deeper. Also, there appears to be an aquitard at approximately 200 feet which
787 hydraulically separates the deeper producing zone from shallower groundwater in the aquifer at
788 Tinker AFB (Tinker AFB 2001).

789 The approximate direction of groundwater flow in the Garber-Wellington Aquifer is south and
790 southwest across the southern half of the base and west to northwest across the northern half.
791 Shallow groundwater may discharge to surface streams (gaining stream) or be recharged by
792 streams (losing stream) (OWRB 2006). Both situations occur at Tinker AFB along Crutcho
793 Creek and Soldier Creek. In contrast, water in the Hennessey Water Bearing Zone generally
794 flows to the northeast toward Crutcho Creek from higher topographic areas along the south
795 boundary of the base (Tinker AFB 2002a).

796

Wetlands

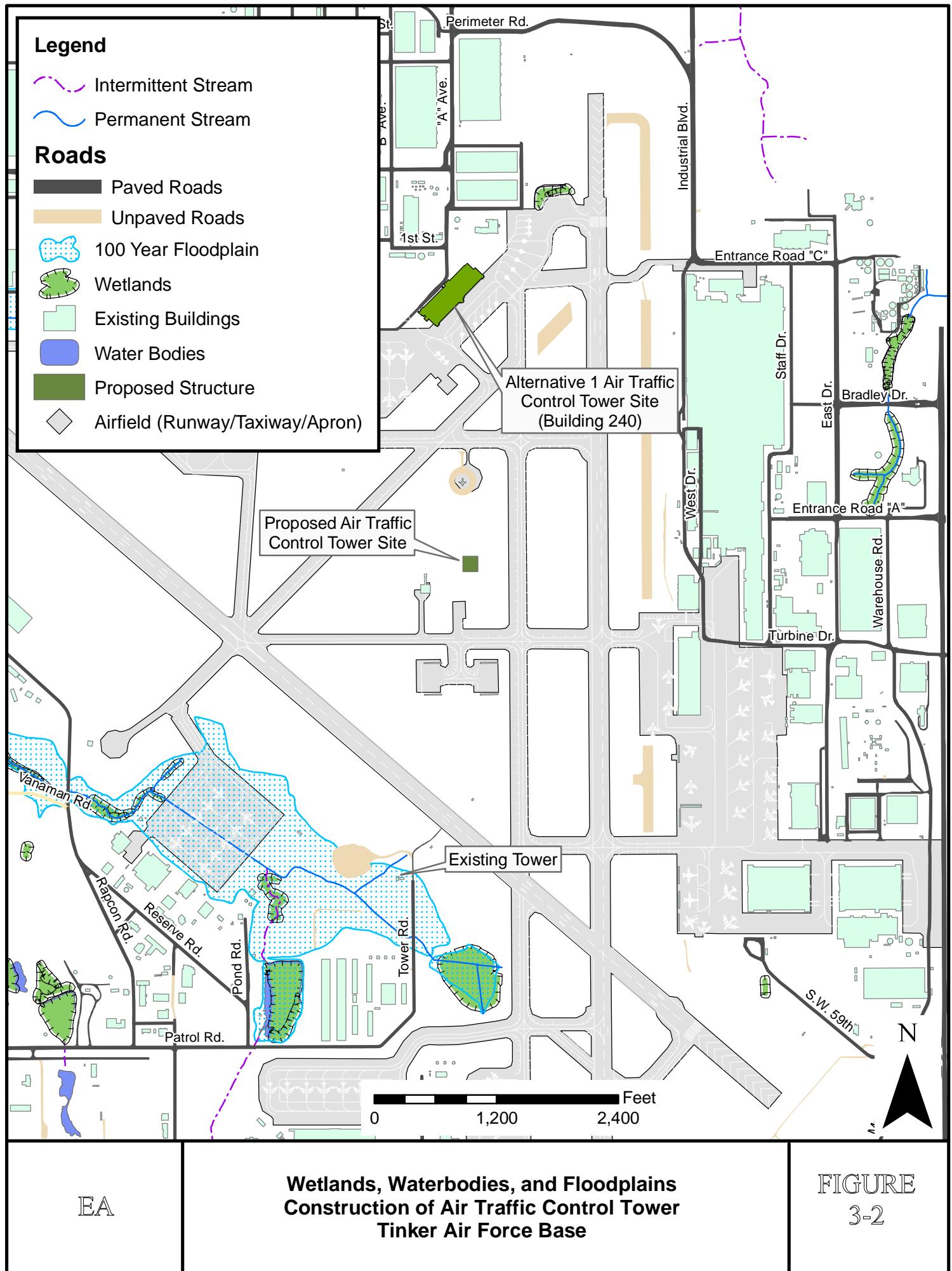
797 In 1995, approximately 65 acres of wetlands were identified on Tinker AFB by USFWS using
798 NWI criteria; these wetlands included creeks, ponds, drainage swales, and other wet areas. Of
799 the 65 acres, 7.9 acres were later classified by the USACE as jurisdictional wetlands under the
800 CWA. The 7.9 acres were divided among five wetland areas: Ground Water Treatment Plant
801 (GWTP) wetland (0.5 acres); Fuel Control Facility wetland (0.8 acres); Greenway wetland (4.8
802 acres); Compressed Natural Gas (CNG) wetland (0.3 acres); and the Glenwood wetland (1.5
803 acres, on-base portion only). This excluded the off-base portion (8.5 acres) of the Glenwood
804 wetland which was located immediately adjacent to and east of the base on county and private
805 land (Tinker AFB 2007a). In 2002, these 65 acres (73 individual wetland areas) were reassessed
806 to track their status and trend (Tinker AFB 2007a). Based on the survey, only two wetlands
807 (i.e., Greenway and Prairie Pond) were classified as high quality wetlands. Thirty-four were
808 classified as intermediate quality, and six as low quality. This study also determined that 31 of
809 the original 73 NWI wetland areas no longer existed or were actually drainage ditches or wet-
810 weather conveyances that did not function as wetlands or aquatic habitat and therefore were not
811 included in the survey. These non-wetland areas covered approximately 27 acres, and most were
812 within the airfield or other highly industrialized areas of the base. Therefore, the current total
813 NWI acreage on Tinker AFB is estimated at 38 acres. These have not been officially “delisted”
814 as wetlands by the USFWS who conducted the original study (Tinker AFB 2007a).

815 In 1999, the Glenwood wetland was drained because it attracted waterfowl which presented a
816 bird/wildlife-aircraft strike hazard (BASH). This reduced the total on-base wetland acreage to
817 6.4 acres. Mitigation for the Glenwood wetland removal included the construction of wetlands
818 in the cities of Choctaw (two wetlands totaling 2.3 acres) and McCloud (3 acres), Oklahoma;
819 Eagle Ridge Institute in Oklahoma City (3 acres); and at the Kids-We-Care site (three wetlands
820 totaling 10 acres) south of Guthrie, Oklahoma (mitigation acreages are approximated [Tinker
821 AFB 2007a]).

822 All jurisdictional wetlands on Tinker AFB were man-made with the exception of the Glenwood
823 wetland, which was created by beaver activity. The GWTP wetland is located on a Superfund
824 site and therefore is regulated under the Comprehensive Environmental Response,
825 Compensation, and Liability Act (CERCLA) by the USEPA. The vegetation and soils of the
826 GWTP wetland were removed in 1999 as part of a Soldier Creek remediation effort (Tinker AFB
827 2005a).

828 Recent discussions and correspondence with USACE determined that the Fuel Control Facility
829 wetland was not within the jurisdiction of the USACE (Tinker AFB, 2007c). The wetland likely
830 provides some flood control and water cleansing functions to East Soldier Creek as stormwater
831 from nearby urbanized landscapes filters through the wetland prior to entering the Soldier Creek
832 drainage.

833 No wetlands are located on or near either the Proposed Action site or the Alternative 1 location
834 (Figure 3-2).



837 **Floodplains**

838 In October 2002, USACE, Southwestern Division-Tulsa District, completed a study for Tinker
839 AFB to update the 100-year and 500-year floodplains. The 100-year and 500-year floodplains
840 were reassessed for the Middle Branch, Upper Crutcho Creek (the Eastern Branch), and Upper
841 Crutcho Creek (Western Branch) (USACE 2002). Crutcho Creek and its tributaries and
842 Kuhlman Creek are bounded by 100-year and 500-year floodplains designated by FEMA.
843 These floodplains affect approximately 520 acres of base land (Figure 3-2) (Tinker AFB 2007b).
844 The bulk of these floodplains are located along Crutcho Creek. However, no FEMA-designated
845 floodplains exist along the smaller, intermittent streams that exist on the base (USACE 2002).
846 No 100- or 500-year floodplains have been designated on the Proposed Action site or Alternative
847 1 location (Figure 3-2). However, the current ATCT facility, B935, is located in a designated
848 100-year floodplain.

849 **3.3 Biological Resources**

850 **3.3.1 Definition of Resources**

851 Biological resources include native or naturalized plants and animals and the habitats in which
852 they occur. Sensitive biological resources are defined as those plant and animal species listed as
853 threatened or endangered, candidate, rare, and other sensitive flora and fauna, or proposed as
854 such, by the USFWS and respective State agencies. Federal and State Species of Concern are
855 not protected by law; however, these species could become listed or protected at any time if not
856 properly managed. Threatened and endangered species are federally protected plants and
857 animals that are in danger of becoming extinct without protection. These species may be rare
858 because of specialized habitat needs or habitat destruction. The ESA of 1973 protects listed
859 species against killing, harming, harassment, or any action that may damage their habitat.

860 **3.3.2 Existing Conditions**

861 **3.3.2.1 Regional Setting**

862 The landscape of Oklahoma County is characterized by level to gently rolling hills, broad flat
863 plains and bottomlands intersected by small to medium sized watercourses. The County is part
864 of the Cross Timbers Vegetation Area of the Midwest and the Central Oklahoma/Texas Plains or
865 Central Great Plains (Tinker AFB 2001).

866 **Vegetation**

867 The original vegetation cover in the central Oklahoma uplands consisted of mixed forests and
868 woodlands interspersed with areas of open grasslands. These original plant communities have
869 been radically altered through development, deforestation, intensive agriculture, and the
870 introduction of invasive species (Tinker AFB 2001). However, many smaller portions of these
871 vegetative communities still comprise Oklahoma County's vegetation. Upland forests integrated
872 with woodlands and prairie comprise Oklahoma County's primary vegetation community.

873 Intermixed in this community are woodlands of oaks, upland forests of deciduous or evergreen
874 trees, and grasslands intermixed with blue grama (*Bouteloua gracilis*), buffalo grass (*Bouteloua*
875 *dactyloides*), and non-native grasses (Hoagland 1999). The County's vegetative community also
876 includes riparian areas adjacent to streams, drainage channels, and in low-lying areas where
877 water availability is relatively greater than the surrounding landscape (Tinker AFB 2002a).

878 Much of the native vegetative communities associated within Oklahoma City and the Tinker
879 AFB area has been replaced with developed landscape and ornamental and non-native vegetation
880 (University of Oklahoma [OU] 2006).

881 **Wildlife**

882 Approximately 350 native vertebrate species and a much greater unknown number of
883 invertebrates have historically occurred either in the Central Oklahoma/Texas Plains or Central
884 Great Plains Ecoregions (Oklahoma Department of Wildlife Conservation [ODWC] 2007).
885 Some species that probably occurred on this land during pre-settlement times include prairie
886 dogs, bear, bison, wolves, elk, and horses. Numerous other species have been displaced by
887 urban and industrial activities on and around Tinker AFB.

888 Six species are federally listed as threatened or endangered in Oklahoma County by USFWS
889 (Table 3-1). The State of Oklahoma has an endangered species act for plants and animals;
890 species listed on the federal list correspond with those on the state list (Oklahoma Natural
891 Heritage Inventory [ONHI] 2003).

892 **Table 3-1 Special Status Plant and Animal Species of Oklahoma County**

Scientific Name	Common Name	State Status ¹	Federal Status ¹
Birds			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T, Delisted ²	T, Delisted ²
<i>Vireo atricapillus</i>	Black-Capped Vireo	E	E
<i>Sterna antillarum</i>	Least Tern	E	E
<i>Charadrius melanotos</i>	Piping Plover	T	T
<i>Grus americana</i>	Whooping Crane	E	E
<i>Tyto alba</i>	Barn Owl	CS, SS2	
<i>Buteo swainsoni</i>	Swainson's Hawk	SS2	
<i>Athene cunicularia</i>	Burrowing Owl	SS2	
<i>Lanius ludovicianus migrans</i>	Migrant Loggerhead Shrike	SS2	
Fish			
<i>Notropis girardi</i>	Arkansas River Shiner	T	T

893

894 **Table 3-1 Special Status Plant and Animal Species of Oklahoma County (Continued)**

Scientific Name	Common Name	State Status ¹	Federal Status ¹
Mammals			
<i>Marmota monax</i>	Woodchuck	SS2	
Reptiles			
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	SS2	
Plants			
<i>Penstemon oklahomensis</i>	Oklahoma Penstemon	S3	

895 ¹Legal Status:

896 • E – Endangered
897 • T – Threatened
898 • CS – Statewide closed season (state ranking). It is unlawful at any time to possess or to kill individuals of these
899 species or to remove any individuals of these species from their natural habitats.
900 • SS2 - Species of Special Concern (state ranking). These species have been identified by technical experts as
901 possibly threatened of extirpation but for which additional information is needed.
902 • S3 - Rare and local in Oklahoma (though it may be abundant at some of its locations); in the range of 21-100
903 occurrences.

904 ²Bald Eagle delisted from threatened status by USFWS on June 28, 2007.

905 Sources: USFWS 2007; Tinker AFB 2007a.

906 **3.3.2.2 Tinker AFB and Proposed Project Location**

907 **Vegetation**

908 The area now occupied by Tinker AFB was historically dominated by tall and/or mixed grass
909 prairie (Tinker AFB 2007a). Less than 2 percent of the pre-settlement prairie ecosystem
910 currently remains on Tinker AFB. No pristine native prairie or bottomland areas are present on
911 the installation. Only a few small, fragmented prairie remnants, less than 100 acres total, remain,
912 and these are in degraded condition. Much of the original prairie was farmed as evidenced by
913 remaining terraces at numerous locations on the base (Tinker AFB 2002a). Approximately half
914 of the Tinker AFB land area (2,620 acres) has been developed for buildings, roads, pavement,
915 railroads, and other structures. About 20 percent of the current land area (1,036 acres) is
916 periodically maintained grounds (i.e., semi-improved grounds) such as the airfield.
917 Approximately 14 percent of the land (700 acres) is highly maintained grounds (i.e., improved
918 grounds) such as lawns, athletic fields, and a golf course. The remaining 14 percent (684 acres)
919 is not maintained (i.e., unimproved grounds), and includes areas such as the Urban Greenway
920 and Glenwood areas (Tinker AFB 2001). Seven vegetation types (including 31 vegetation
921 communities within those vegetation types) are found at Tinker AFB (Tinker AFB 2007a):

922 • Grassland – Characteristic of a native mid-grass prairie;
923 • Field – Successional stage of native and/or exotic species of grasses and forbs;
924 • Forest/Woodland – Close stand (forest) or open growth (woodland) in a natural area;

925 • Transitional Forest/Woodland – Successional stage of native and/or exotic trees
926 configured in a close (forest) or open (woodland) stand, primarily in previously disturbed
927 areas;

928 • Urban/Industrial – Dominated by turf grass, associated forbs, and ornamental herbaceous
929 and woody plants;

930 • Transitional Urban/Industrial – Indigenous and exotic plants with a predominance of
931 ornamental vegetation; and

932 • Wetland/Marsh – Dominated by mesophytes (plants growing under medium moisture
933 conditions) and/or hydrophytes (plants growing under high moisture conditions) and
934 located in areas temporarily or permanently inundated.

935 Within the areas that have been converted to urban and industrial use, the plant community is
936 comprised primarily of turf grasses and ornamental trees and shrubs. The predominant turfgrass
937 on Tinker AFB is Bermuda grass. Native buffalo grass is often found mixed with Bermuda
938 grass. Other more rural areas are typically a mixture of exotic and native plants. Trees and
939 shrubs are composed of native and exotic plants, and, contrary to pre-settlement plant
940 distribution, many woody plants are found on upland as well as bottomland sites (Tinker AFB
941 2001).

942 **Wildlife**

943 Wildlife at the site proposed for the Control Tower is limited to those species adapted to high
944 levels of human activity and disturbance. Tinker AFB is classified as a Category 1 installation,
945 as defined in AFI 32-7064, *Integrated Natural Resources Management*, meaning that suitable
946 habitat for conserving and managing fish and wildlife exists (Tinker AFB 2007a). The available
947 habitat includes movement corridors (e.g., riparian zones along creeks) and pockets of
948 undeveloped acreage surrounded by urbanized land (USAF 1991) (Figure 3-3). The results of a
949 1990 reconnaissance survey indicated that approximately 1,800 acres were suitable or potentially
950 suitable as wildlife habitat (USAF 1991). Included in this estimate were approximately
951 400 improved acres (military family housing and golf course), 600 semi-improved acres (mostly
952 airfield), and 800 unimproved acres.

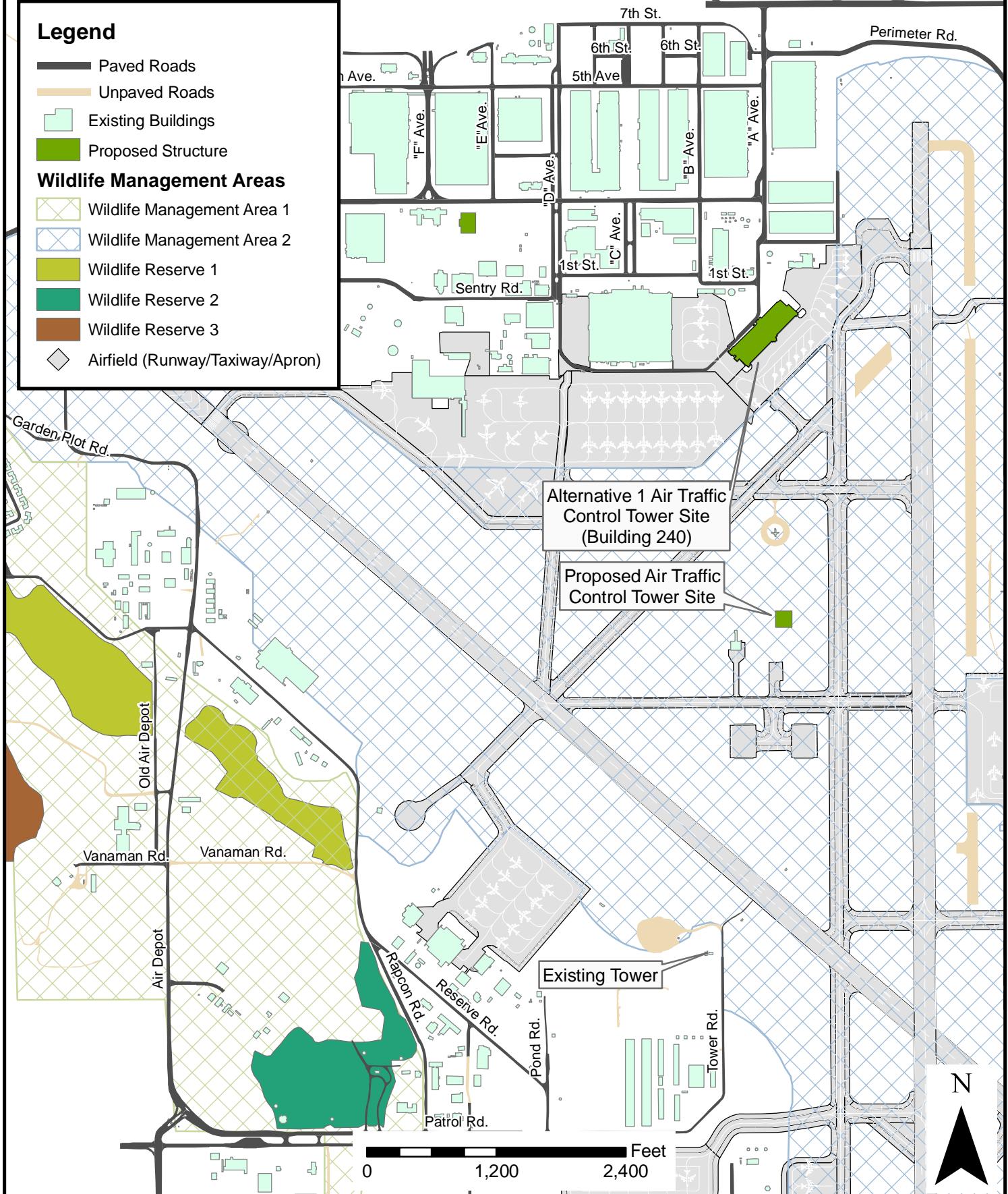
953 Common mammalian species found on Tinker AFB include fox squirrel (*Sciurus niger*), eastern
954 cottontail (*Sylvilagus floridanus*), beaver (*Castor canadensis*), coyote (*Canis latrans*), raccoon
955 (*procyon lotor*), striped skunk (*Mephitis mephitis*), deer mouse (*Peromyscus maniculatus*), hispid
956 cotton rat (*Sigmodon hispidus*), black-tailed jackrabbit (*Lepus californicus*), and opossum
957 (*Didelphis virginianus*) (USACE 1995; Tinker AFB 2007). Resident bird species include
958 mourning dove (*Zenaida macroura*), barn swallow (*Hirundo rustica*), red-winged blackbird
959 (*Agelaius phoeniceus*), meadowlark (*Sturnella* spp.), scissor-tailed flycatcher (*Tyrannus*
960 *forficatus*), great-horned owl (*Bubo virginianus*), and bobwhite quail (*Colinus virginianus*).
961 Several reptile and amphibian species are commonly found at Tinker AFB. These include Texas

Legend

- Paved Roads
- Unpaved Roads
- Existing Buildings
- Proposed Structure

Wildlife Management Areas

- Wildlife Management Area 1
- Wildlife Management Area 2
- Wildlife Reserve 1
- Wildlife Reserve 2
- Wildlife Reserve 3
- Airfield (Runway/Taxiway/Apron)



**Wildlife Management Areas
Construction of Air Traffic Control Tower
Tinker Air Force Base**

EA

FIGURE
3-3

963 horned lizard (*Phrynosoma cornutum*), ringneck snake (*Diadophis punctatus*), three-toed box
964 turtle (*Terrapene carolina*), and bullfrog (*Rana catesbeiana*). The results of fish surveys at
965 Tinker AFB indicate that 23 species of fish occur on base. Five species occur in ponds on the
966 base while 18 species of fish occur in those portions of Crutcho, Kuhlman, and Soldier Creeks
967 that are located on Tinker AFB (Tinker AFB 2002a). Some ponds on the facility have been
968 stocked with fish including catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus*
969 *salmoides*), bluegill (*Lepomis macrochirus*), and fathead minnows (*Pimephales promelas*).

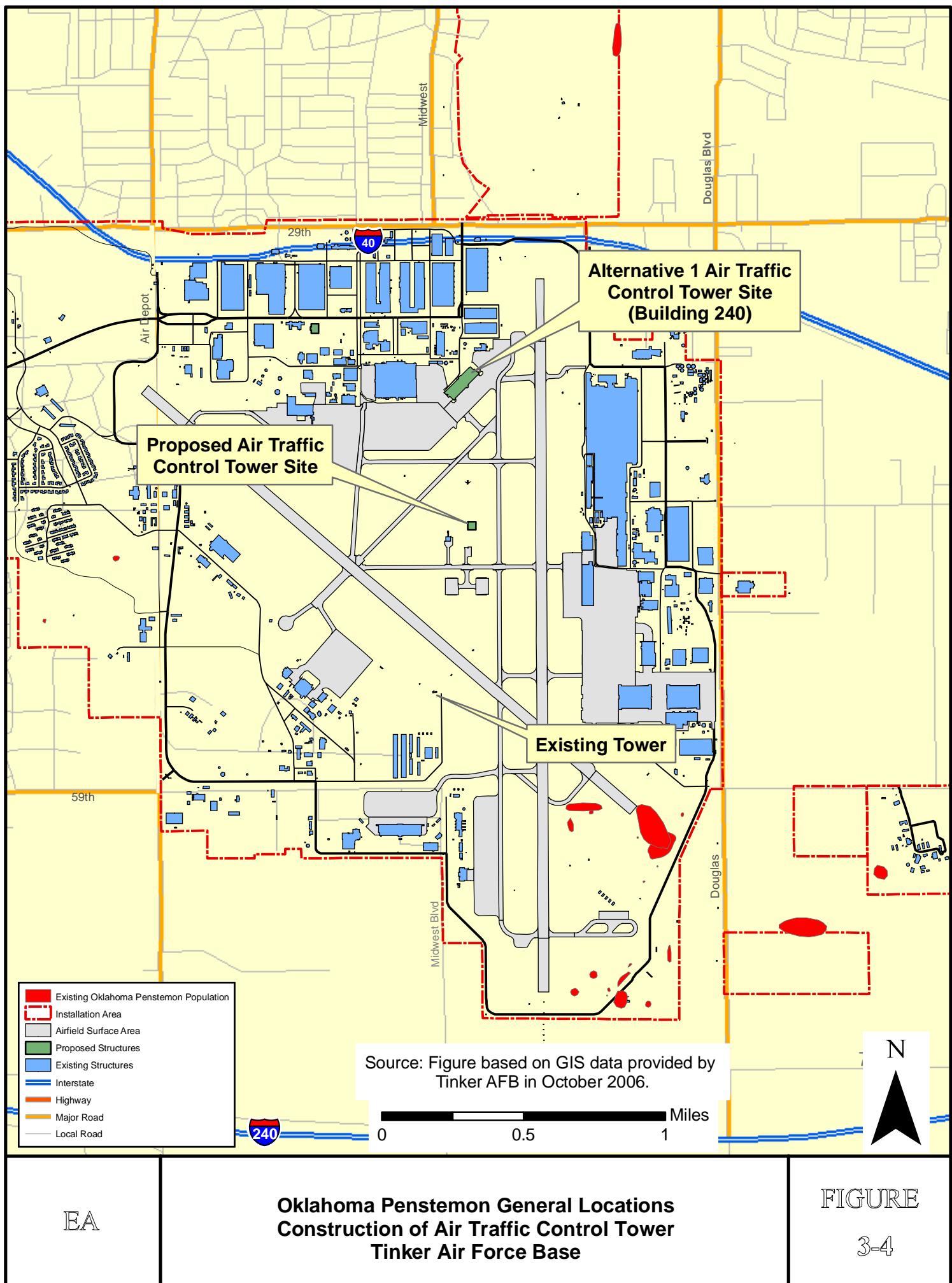
970 The location proposed for the ATCT and the Alternative 1 location consist of one general habitat
971 type: field. The field likely provides habitat for species typical of grasslands that can also
972 tolerate disturbed urbanized habitats, such as deer mouse, cottontail, and meadowlark
973 (Figure 3-3).

974 **Threatened and Endangered Species**

975 Field surveys were conducted at Tinker AFB during 1993 and 1994 to identify federally listed
976 endangered or threatened species (USACE 1995) or state designated sensitive species (Johnson
977 et al. 1995). No federal or state-listed threatened or endangered species were found during this
978 survey or documented on other occasions on Tinker AFB (USACE 1995; Tinker AFB 2007a).
979 However, the Oklahoma penstemon (*Penstemon oklahomensis*), which is classified as rare under
980 the ONHI, has been documented at numerous locations on Tinker AFB (Figure 3-4) (Tinker
981 AFB 2007a). The ONHI lists the species as G3S3 (restricted range) (ONHI 2003).

982 One federally listed species is known to be a seasonal resident of the local area, the whooping
983 crane (*Grus americana*). The nearest known sightings are around Lake Arcadia and Lake
984 Thunderbird (approximately 9 miles and 22 miles from Tinker AFB, respectively). It is unlikely
985 these species would forage along creeks and open areas adjacent to the proposed project site, as
986 these habitats are generally urban and of poor quality for the subject species (Tinker AFB
987 2002a). Base-wide surveys for the black-capped vireo (*Vireo atricapilla*) were conducted in
988 1993 and 1994, and none were sighted during these surveys (Tinker AFB 2002a).

989 Three state special concern species were found within Tinker AFB during this survey. These
990 include Texas horned lizard (*Phrynosoma cornutum*), barn owl (*Tyto alba*), and loggerhead
991 shrike (*Lanius ludovicianus*). It is not known whether the loggerhead shrikes observed were the
992 migrant race (*migrans*). Burrowing owl (*Athene cunicularia*) and Swainson's hawk
993 (*Buteo swainsoni*), both state species of special concern, have also been documented within
994 Tinker AFB (Tinker AFB 2007a). The USFWS defines species of concern for the future well-
995 being of the species, but the species does not receive any protection under the ESA.
996 AFI 32-7064, *Integrated Natural Resources Management*, states that species having such a status
997 should be considered in future planning and facility siting as well as provided protection
998 wherever possible. The state special concern species identified at Tinker AFB are discussed
999 below.



1001 **Texas Horned Lizard.** Texas Horned Lizards range from the South-Central U.S. to Northern
1002 Mexico (Texas Parks and Wildlife [TPW] 2000). They occur in open areas with sparse to
1003 slightly more dense plant cover with corridors of sparse vegetation, in arid and semiarid habitats
1004 in Oklahoma. They primarily eat ants. The species has been documented in sparsely vegetated
1005 grassland areas in the southwest corner of Tinker AFB with isolated observations in the southeast
1006 and northern areas of the base (Tinker AFB 2007a). Sparsely vegetated areas within the
1007 proposed project site are quite limited. The species could possibly, but not likely, occur in these
1008 areas.

1009 **Barn Owl.** The barn owl is found throughout most of the United States and is a rare resident of
1010 most of Oklahoma. It usually occupies relatively open areas, such as prairies, meadows, and
1011 marshes. The barn owl nests and roosts in buildings, cliffs and trees. The diet of the owl
1012 consists primarily of rodents or small birds, and occasionally insects (Oberholser 1974). Barn
1013 owls have been observed in northeastern portions of Tinker AFB in the Glenwood area (USAF
1014 1991).

1015 **Swainson's Hawk.** Swainson's hawk occurs throughout the Tinker AFB on relatively open
1016 lands and has historically nested along Kuhlman Creek south of the golf course (Tinker AFB
1017 2007a).

1018 **Burrowing Owl.** Burrowing owls inhabit grasslands and are frequently associated with prairie
1019 dog colonies. They have been observed on the airfield and in Reserve 3 of the Urban Greenway
1020 in winter (Tinker AFB 2007a). The species is believed to be a winter visitor to Tinker AFB, and
1021 no nests have been documented.

1022 **Oklahoma Penstemon.** Oklahoma Penstemon is found only in Oklahoma but is very abundant
1023 at numerous locations within Oklahoma (ONHI 2003). It is found in prairies, oak savannas,
1024 abandoned fields, and along roadsides (Johnson et al. 1995). The penstemon is located in
1025 fragmented remnant native prairie communities, primarily in the southeast portion of the base to
1026 include the airfield, Engineering Installation Group (EIG), and Douglas Field. Other small
1027 populations occur in the northeastern portion of Glenwood and at the Fuel Control Facility
1028 (Tinker AFB 2007a) (Figure 3-4).

1029 All DoD installations are required to perform a threatened and endangered species survey prior
1030 to any activities that disturb habitat that potentially supports such species. However, there are no
1031 threatened or endangered species known to occur in the immediate vicinity of the proposed
1032 Control Tower site. Furthermore, no designated critical habitat or wilderness areas are located
1033 on or in the immediate vicinity of the base (USFWS 2006b & 2006c). Further information
1034 summarizing special status species potentially found at the proposed project site is included in
1035 Table 3-2.

1036 **Table 3-2 Special Status Species Potentially Occurring on the Proposed Action and**
 1037 **Alternative 1 Site**

Scientific name Common Name	Status	Habitat Requirements	Habitat	Range	Presence at Proposed Location
Federally Listed Species					
<i>Charadrius melanotos</i> (Piping plover)	T	Sand/gravel areas on lakes, river, and ponds	U	C	UN
<i>Haliaeetus leucocephalus</i> (Bald eagle)	D, T	Trees or cliffs near water; oceans, rivers or lakes	U	C	UN
<i>Grus Americana</i> (Whooping crane)	E	Marshes	U	Mi	UN
<i>Sterna antillarum athalassos</i> (Interior least tern)	E	Islands/sandbars in large rivers; sandy areas, shallow water	U	C	UN
State Special Concern Species					
<i>Athene cunicularia</i> (Burrowing owl)	SS2	Grasslands, prairie dog colonies	M	C	PO
<i>Buteo swainsoni</i> (Swainson's hawk)	SS2	Plains, range, open hills, sparse trees	M	C	PO
State Special Concern Species					
<i>Lanius ludovicianus migrans</i> ¹ (Migrant loggerhead shrike)	SS2 SC	Open country with scattered trees, scrub, deserts, roadsides	S	C	PO
<i>Phrynosoma cornutum</i> (Texas horned lizard)	CS SS2 SC	Semi-arid open country with sparse plant growth	M	C	PO
<i>Tyto alba</i> (Barn owl)	SS2	Feeds in grasslands; nests in caves, trees, and buildings	S	C	UN
ONHI					
<i>Penstemon oklahomensis</i> Oklahoma penstemon	G3S3	Prairies, oak savannas, abandoned fields, and along roadsides	S	C	PO

1038

1039 Sources: ODWC 2007; USAF 1991; Tinker AFB 2007a.

1040 Key:

1041 Status Codes*

1042 E Federally and State Endangered

1043 T Federally and State Threatened

1044 SC Federal Species of Concern (Former C2 Candidates, list no longer maintained by USFWS)

1045 CS Statewide Closed Season

1046 SS2 State Special Concern Category II

1047 G3 Rare globally

1048 S3 Rare and local in Oklahoma (may be locally abundant)

1049 *Federally listed endangered or threatened species are automatically included on Oklahoma's state list in the same category

1050 Habitat Codes

				<u>Presence Codes</u>
S	Suitable	H	Historic	UN Unlikely
M	Marginal	C	Current	PO Possible
U	Unsuitable	Mi	Migratory	V Verified (in the immediate vicinity of proposed ATCT)
		P	Periphery	

1051 Notes:

1052 ¹Loggerhead shrikes have been documented on Tinker AFB. It is unknown whether the migrant race occurs (Tinker AFB 2007a).

1053 All species listed by USFWS 2002 as occurring in Oklahoma County were included in table.

1054 State sensitive species include those species that have been documented on Tinker AFB according to Tinker AFB 2007a.

1061 **3.4 Transportation and Circulation**

1062 **3.4.1 Definition of Resource**

1063 Transportation and circulation refer to the movement of vehicles throughout a road and highway
1064 network. Primary roads are principal arterials, such as major interstates, designed to move traffic
1065 and not necessarily to provide access to all adjacent areas. Secondary roads are arterials such as
1066 rural routes and major surface streets which provide access to residential and commercial areas,
1067 hospitals, and schools.

1068 **3.4.2 Existing Conditions**

1069 **3.4.2.1 Regional and Local Circulation**

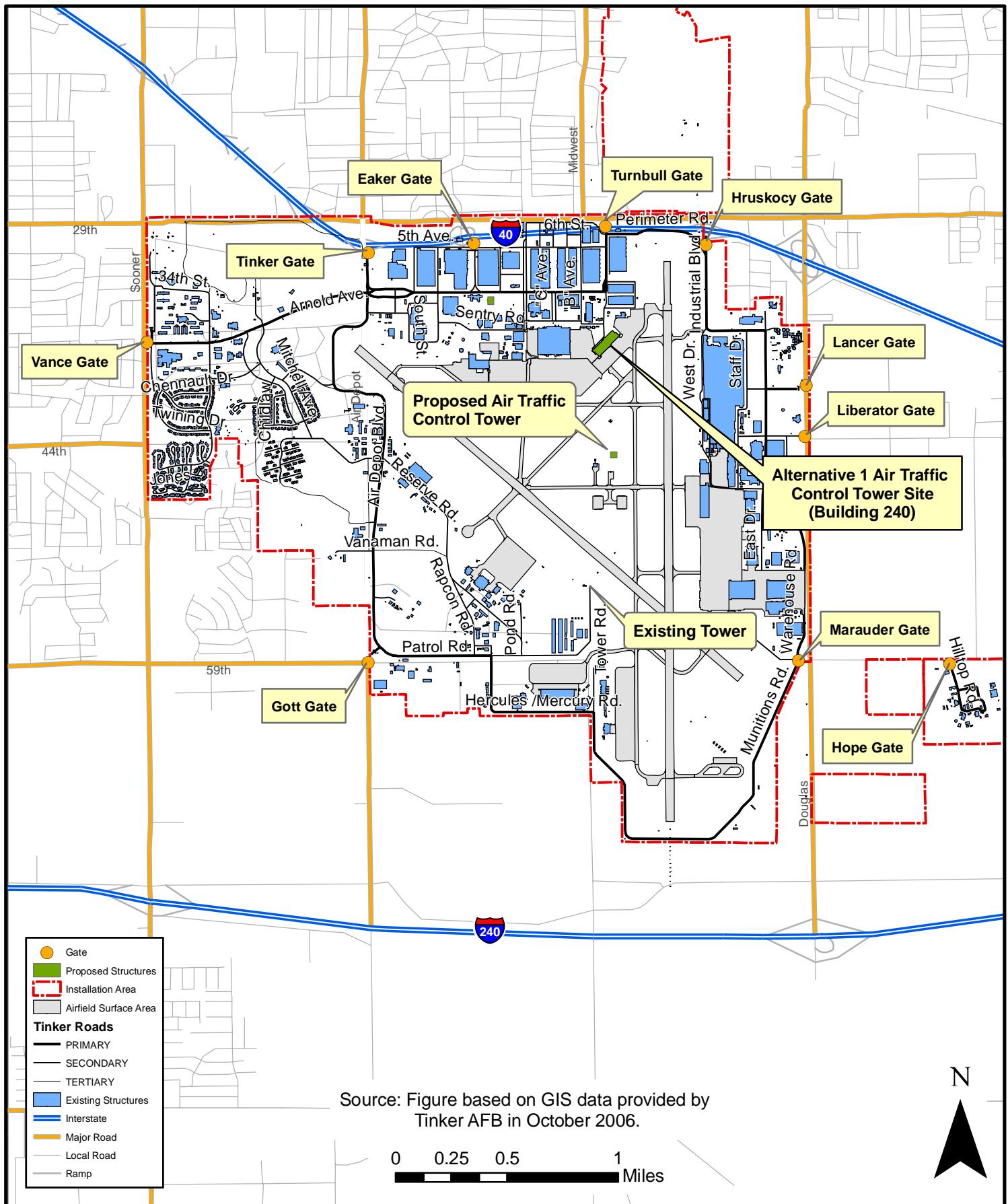
1070 Tinker AFB is located within the city limits of Oklahoma City, approximately 9 miles, by
1071 surface roads, southeast of downtown. Oklahoma City is served by a network of interstates and
1072 local and regional arterial roads. Four interstates, I-40, I-35, I-240, and I-44, pass through
1073 Oklahoma City and provide regional access to the base.

1074 Three arterial roads, including Sooner Road, Southeast 29th Street, and Douglas Boulevard, and
1075 two interstates, I-40 and I-240, provide local access to Tinker AFB. Sooner Road is a north-
1076 south, four-lane arterial that forms part of the western border of the base. Southeast 29th Street is
1077 an east-west arterial that – together with I-40 – forms the northern boundary of the base.
1078 Douglas Boulevard is a four-lane, north-south arterial that forms the eastern boundary of the base
1079 and provides access to the base through the Lancer Gate. I-40 runs along the northern boundary
1080 of the base and provides access to the base via Air Depot Boulevard/Tinker Gate and Eaker Gate.
1081 Interstate-240, an east-west principal arterial located south of the base, provides access to the
1082 base by Sooner Road, Air Depot Boulevard (Gott Gate) and Douglas Boulevard.

1083 **3.4.2.2 Tinker AFB and at the Proposed Project Location**

1084 **Circulation**

1085 A network of arterial, collector, and local roads serves Tinker AFB. A system of local roads
1086 supports the majority of the traffic at the base. Air Depot Boulevard, East Drive, Arnold
1087 Avenue, and Patrol Road are the major arterial roads. A network of primarily two-lane collector
1088 roads provides access to facilities on the base and to the arterial network. McNarney Avenue,
1089 Reserve Road, and Mitchell Avenue are the primary collector roads.



EA

**Tinker AFB Gate Locations
Construction of Air Traffic Control Tower
Tinker Air Force Base**

FIGURE

3-5

1091 Ten gates are located on the perimeter of Tinker AFB (Tinker AFB 2005a) (Figure 3-5). Eaker
1092 Gate (Gate #2) and Lancer Gate (Gate #20) are open 24 hours per day, 7 days per week. The
1093 remaining gates are open at various times to accommodate peak flow; these gates and their
1094 associated base access routes include the following:

- 1095 • Tinker Gate, via Southeast 29th Street and Air Depot Boulevard;
- 1096 • Eaker Gate (Gate #2), via Southeast 29th Street and F Avenue;
- 1097 • Lancer Gate, via Douglas Boulevard;
- 1098 • Gott Gate (Gate #34), via Air Depot Boulevard;
- 1099 • Vance Gate (Gate #40), via Sooner Road and Arnold Street;
- 1100 • Hope Gate (38 EIG), via Southeast 59th Street;
- 1101 • Turnbull Gate (Gate #3) at A Avenue and Southeast 29th Street;
- 1102 • Hruskocy Gate (Gate #7), via Perimeter Road and Industrial Boulevard;
- 1103 • Liberator Gate (Gate #21) Entrance Road A and Douglas Boulevard; and
- 1104 • Marauder Gate (Gate #29) at Southeast 59th Street and Douglas Boulevard.

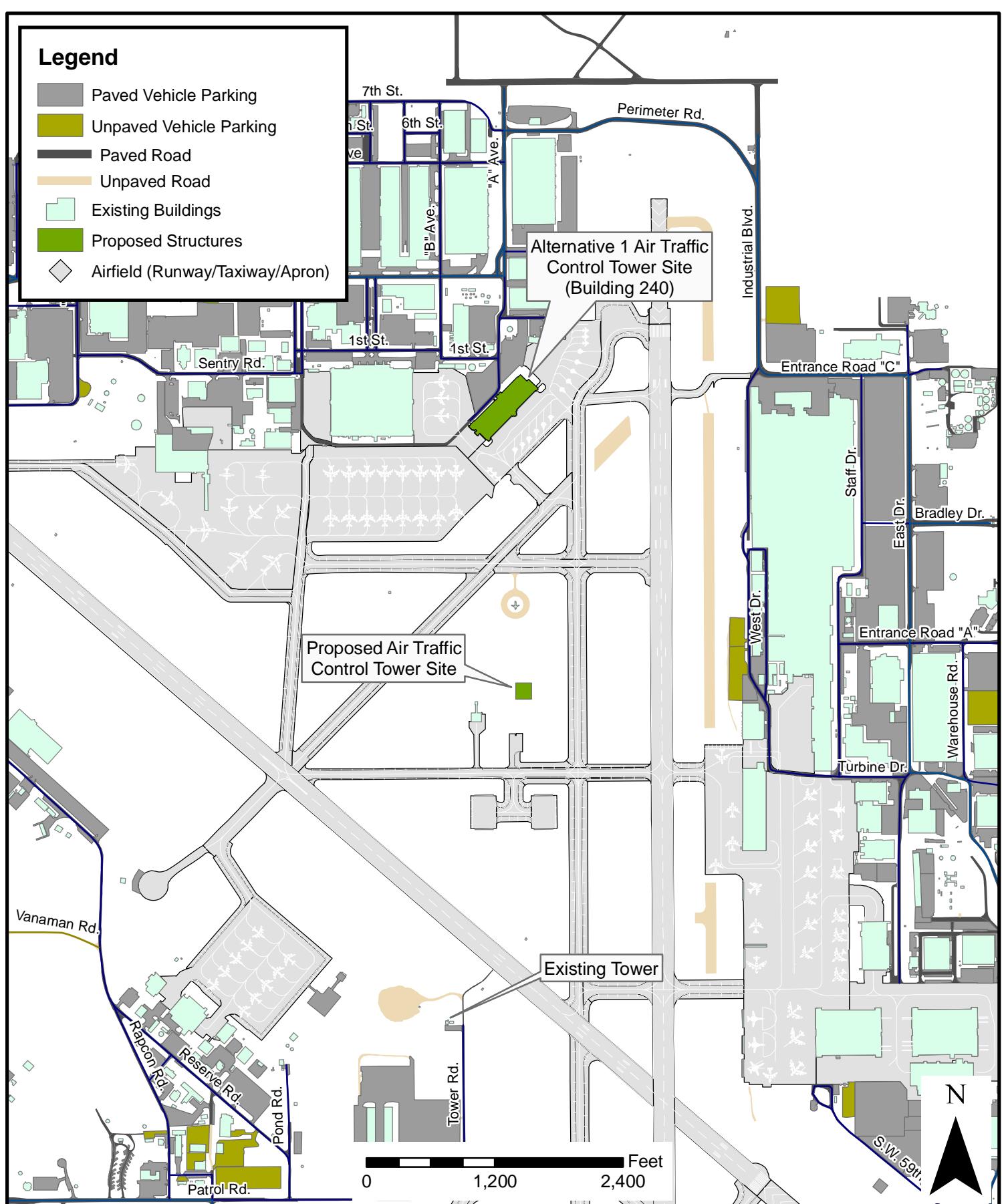
1105 Access to the current ATCT site is on Tower Road, via Patrol Road. One gate (Gott Gate)
1106 accesses the southwest portion of the base and direct access to the existing ATCT. The proposed
1107 ATCT would be developed on property located in the general area of the existing Engine
1108 Hushhouse, B926, north of the existing Control Tower, in proximity to midfield. This location is
1109 approximately 1,750 feet west of the Runway 17/35 centerline and 7,500 feet east of the Runway
1110 17 Threshold (Figure 3-6). Access to this site would be via a newly constructed road connected
1111 to an adjacent, active taxiway. The majority of traffic to the Proposed ATCT site would enter
1112 base via Tinker, Eaker, and Vance Gates.

1113 **Parking**

1114 The USAF has established guidelines (Air Force Handbook (AFH) 32-1084, *Facility*
1115 *Requirements*) intended to ensure that adequate parking is available at USAF installations;
1116 according to these standards, the ratio of available parking spaces to personnel should be no less
1117 than 38 percent of the largest shift of civilian employees. Tinker AFB reports that 750 parking
1118 spaces are currently available for privately owned vehicles (POVs) of the 507 ARW. The total
1119 number of 507 ARW employees at Tinker AFB (including both full-time and part-time
1120 reservists) is approximately 1,100. Therefore, the ratio of available parking spaces to personnel
1121 on drill weekends when all employees are present is more than the USAF standard. Parking is a
1122 constraint when all 507 ARW personnel are on base; however, it is rare that all 1,100 personnel
1123 are on site at the same time. To alleviate this parking issue, the 507 ARW reservists are broken
1124 down into groups and the training weekends for the groups are staggered. Gate counts were not
1125 available at the time of this report to fully evaluate the current base-wide parking and traffic
1126

Legend

- Paved Vehicle Parking
- Unpaved Vehicle Parking
- Paved Road
- Unpaved Road
- Existing Buildings
- Proposed Structures
- Airfield (Runway/Taxiway/Apron)



EA

**Transportation and Circulation
Construction of Air Traffic Control Tower
Tinker Air Force Base**

**FIGURE
3-6**

1128 constraints. The current ATCT site has 27 parking spaces to accommodate 33 employees.
1129 The proposed ATCT site will include construction of a parking area containing 24 parking
1130 spaces to accommodate 33 employees.

1131 **3.5 Cultural Resources**

1132 **3.5.1 Definition of Resource**

1133 Cultural resources represent and document activities, accomplishments, and traditions of
1134 previous civilizations and link current and former inhabitants of an area. Depending on their
1135 conditions and historic use, these resources may provide insight to living conditions in previous
1136 civilizations and may retain cultural and religious significance to modern groups.

1137 *Archaeological resources* include areas where prehistoric or historic activity measurably altered
1138 the environment or deposits of physical remains (e.g., arrowheads, bottles) discovered therein.
1139 Architectural resources include standing buildings, districts, bridges, dams, and other structures
1140 of historic or aesthetic significance. *Architectural resources* generally must be more than 50
1141 years old to be considered for inclusion in the NRHP, an inventory of culturally significant
1142 resources identified in the United States; however, more recent structures, such as Cold War-era
1143 resources, may warrant protection if they have the potential to gain significance in the future.
1144 *Traditional cultural resources* can include archaeological resources, structures, neighborhoods,
1145 prominent topographic features, habitats, plants, animals, and minerals that Native Americans or
1146 other groups consider essential for the persistence of traditional culture.

1147 The principal federal law addressing cultural resources is the NHPA of 1966, as amended
1148 (16 USC Section 470), and its implementing regulations (36 CFR 800). The regulations,
1149 commonly referred to as the Section 106 process, describe the procedures for identifying and
1150 evaluating historic properties; assessing the effects of federal actions on historic properties; and
1151 consulting to avoid, reduce, or minimize adverse effects. As part of the Section 106 process,
1152 agencies are required to consult with the State Historic Preservation Office (SHPO).

1153 The term *historic properties* refers to cultural resources that meet specific criteria for eligibility
1154 for listing on the NRHP; historic properties need not be formally listed on the NRHP. Section
1155 106 does not require the preservation of historic properties but ensures that the decisions of
1156 federal agencies concerning the treatment of these places result from meaningful considerations
1157 of cultural and historic values and of the options available to protect the properties. The
1158 Proposed Action is an undertaking as defined by 36 CFR 800.3 and is subject to requirements
1159 outlined in Section 106.

1160 The DoD's, American Indian, and Alaska Native Policy governs the department's interactions
1161 with federally recognized tribes. The policy outlines DoD trust obligations, communication
1162 procedures with tribes on a government-to-government basis, consultation protocols, and actions
1163 to recognize and respect the significance that tribes ascribe to certain natural resources and
1164 properties of traditional cultural or religious importance. The policy requires consultation with
1165 federally recognized tribes for proposed activities that could significantly affect tribal resources
1166 or interests.

1167 **3.5.2 Existing Conditions**

1168 **3.5.2.1 Regional History**

1169 Inhabited by plains tribes and sold to the United States by France as a part of the 1803 Louisiana
1170 Purchase, much of what is now Oklahoma was subsequently designated as Indian Territory. As
1171 such, it was intended to provide a new home for tribes forced by the federal government to
1172 abandon their ancestral lands in the southeastern United States. Many of those forced to relocate
1173 in the 1830s were from what were called the Five Civilized Tribes—Cherokee, Choctaw,
1174 Chickasaw, Creek, and Seminole—who soon set up independent nations in the new territory.
1175 After the Civil War, the pressure of westward expansion brought railroads into the Indian
1176 Territory, where the U.S. government began to declare some land available for settlement.
1177 Prairie land surrounding a Santa Fe railroad boxcar station was designated as a townsite when
1178 presidential proclamation opened the central portion of the Indian Territory to claims stakers in
1179 1889.

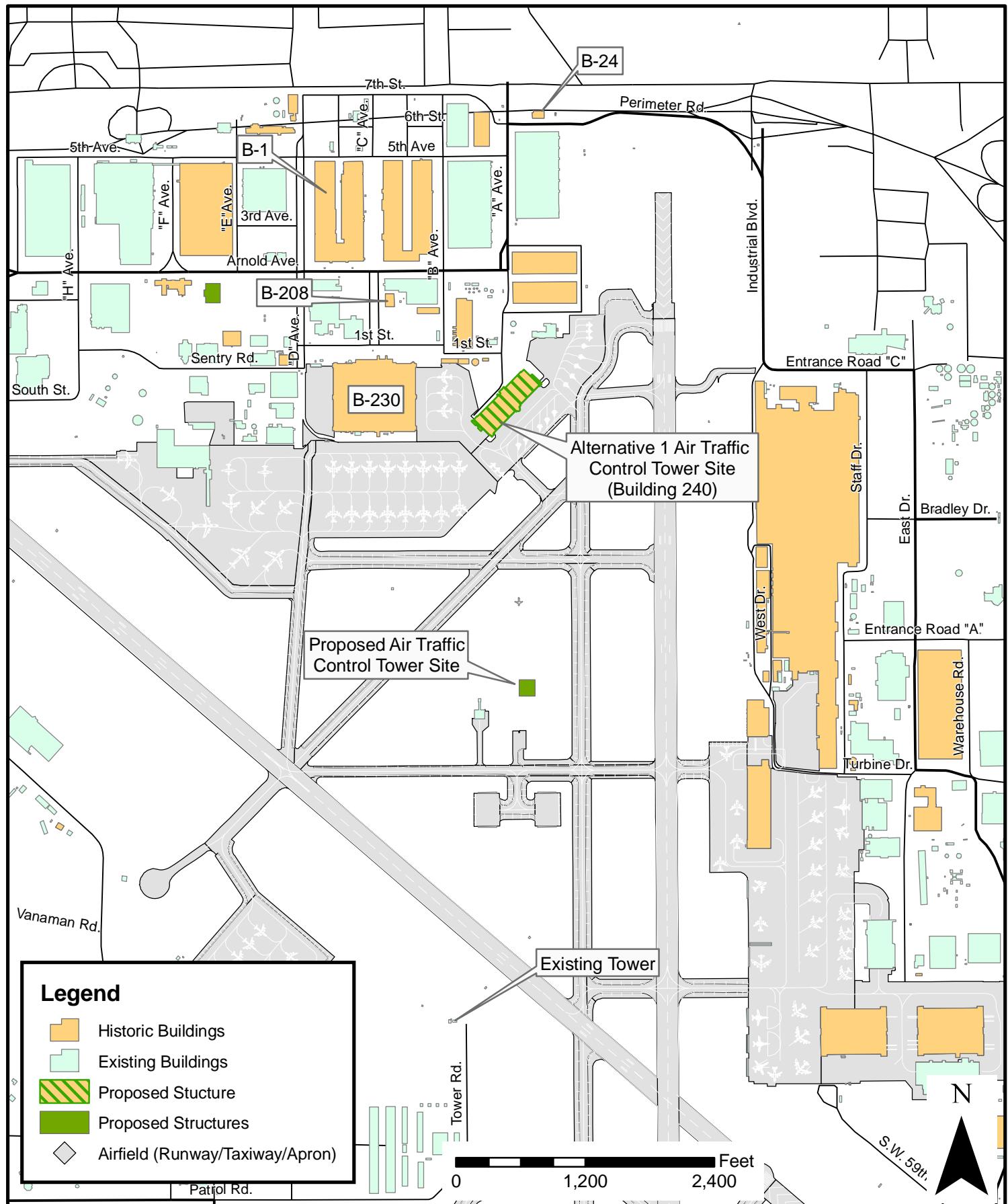
1180 That settlement (now Oklahoma City) attained official status in 1890, just a few weeks after the
1181 western half of the Indian Territory was redesignated Oklahoma Territory. Railroad connections
1182 to the city helped make it a center for trade, milling and meat packing (Oklahoma City
1183 Convention and Visitors Bureau [OCCVB] 2006).

1184 **3.5.2.2 Tinker AFB and the Proposed Project Site**

1185 Tinker AFB has implemented an Integrated Cultural Resources Management Plan (ICRMP),
1186 which is designed to assist the installation in continuing to maintain and operate existing
1187 facilities, and in developing new facilities, as needed, in compliance with federal and state
1188 legislation protecting cultural resources (Tinker AFB 2005c). Cultural resources are protected
1189 under the NHPA of 1966, as amended. Both significant archaeological and historic architectural
1190 resources that have not been evaluated must be considered eligible for the NRHP until
1191 appropriately evaluated and SHPO concurrence has been documented (Tinker AFB 2005c).

1192 Two historic property types have been identified at Tinker AFB: facilities associated with
1193 aircraft construction and modification, 1942-1946; and facilities associated with the Cuban
1194 Missile Crisis, 1962. The Douglas Cargo Aircraft manufacturing area has been designated as a
1195 historic district with seven contributing buildings (Tinker AFB 2002a). Tinker also has five
1196 individually eligible buildings (B1, B208, B230, B240, and B4029) (Tinker AFB 2005a)
1197 (Figure 3-7).

1198 Approximately 131 known archaeological sites are present in areas adjacent to the base (Tinker
1199 AFB 2002a). In the fall of 2000, an archeological survey was completed on a 500-acre area at
1200 the northwest corner of the base. It was determined that the area along Crutcho Creek is most
1201 likely to contain buried archeological sites along the flood deposits of the creek (Tinker AFB
1202 2002a).



**Historic Property Locations
Construction of Air Traffic Control Tower
Tinker Air Force Base**

**FIGURE
3-7**

1204 Tinker AFB has initiated consultations with three Native American tribes: Seminole Nation,
1205 Osage Nation, and Muskogee Nation. These tribes have verbally commented that they have no
1206 Native American Graves Protection and Repatriation Act (NAGPRA) or American Indian
1207 Religious Freedom Act (AIRFA) concerns about Tinker AFB property. Additionally, they have
1208 communicated that Tinker AFB property is not suitable for religious or burial sites (Tinker AFB
1209 2005c). The proposed project site and Alternative 1 ATCT site, both located within the Tinker
1210 AFB Airfield, contain no known or suspected Traditional Cultural Properties (TCP).

1211 **3.6 Hazardous Materials and Wastes**

1212 **3.6.1 Definition of Resource**

1213 Hazardous materials are defined as substances with strong physical properties of ignitability,
1214 corrosivity, reactivity, or toxicity which may cause an increase in mortality, a serious irreversible
1215 illness, incapacitating reversible illness, or pose a substantial threat to human health or the
1216 environment. Hazardous wastes are defined as any solid, liquid, contained gaseous, or semisolid
1217 waste, or any combination of wastes which pose a substantial present or potential hazard to
1218 human health or the environment.

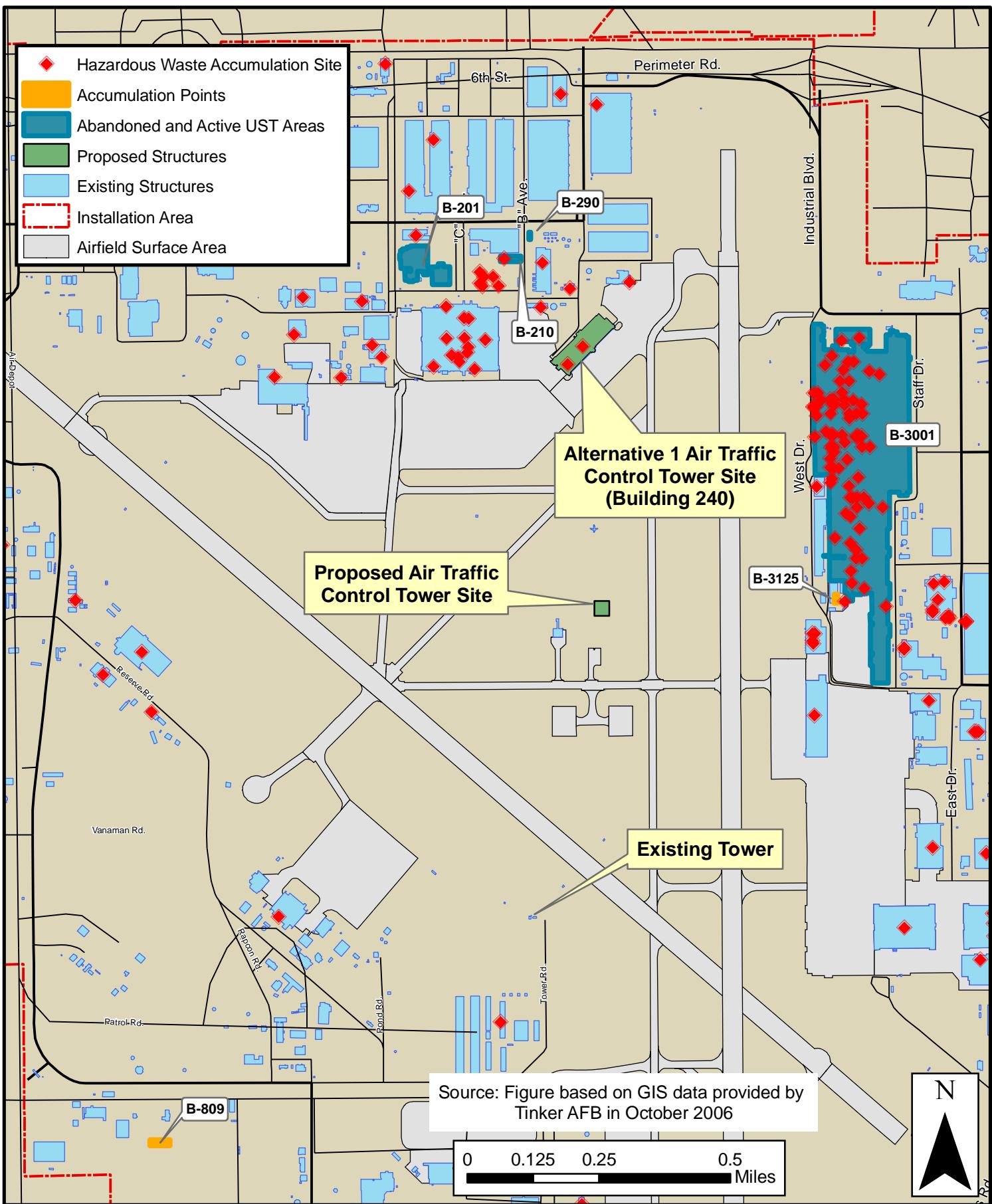
1219 Issues associated with hazardous materials and wastes typically center around underground
1220 storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, and use of
1221 pesticides, bulk fuel, and petroleum, oils, and lubricants (POLs). When such resources are
1222 improperly used they can threaten the health and well-being of wildlife species, botanical
1223 habitats, soil systems, water resources, and people.

1224 To protect habitats and people from inadvertent and potentially harmful releases of hazardous
1225 substances, DoD has dictated that all facilities develop and implement *Hazardous Waste*
1226 *Management Plans* or *Spill Prevention and Response Plans*. Also, DoD has developed the
1227 Environmental Restoration Program (ERP), intended to facilitate thorough investigation and
1228 cleanup of contaminated sites located at military installations. These plans and programs, in
1229 addition to established legislation (e.g., CERCLA and Resource Conservation and Recovery Act
1230 [RCRA]) effectively form the “safety net” intended to protect the ecosystems on which most
1231 living organisms depend.

1232 **3.6.2 Existing Conditions**

1233 **3.6.2.1 Hazardous Materials**

1234 A large amount of hazardous materials are utilized to perform the mission of Tinker AFB. The
1235 Hazardous Materials Management Program (HMMP) manages the procurement and use of
1236 hazardous materials at the base (Figure 3-8). The HMMP functions through the Hazardous
1237 Materials Pharmacy, which consists of a decentralized Hazardous Material Pharmacy Cell and a
1238 Hazardous Materials electronic tracking system, the Hazardous Material Management System
1239 (HMMS).



EA

**Hazardous Waste Accumulation Sites
Construction of Air Traffic Control Tower
Tinker Air Force Base**

FIGURE
3-8

1241 The HMMS database management system performs the following automated functions:

- 1242 • Tracks training, exposure, inventory, and personal protective equipment;
- 1243 • Dispenses hazardous materials according to units of use;
- 1244 • Serves as central issue point for Just-In-Time control and issue;
- 1245 • Creates on-line Material Safety Data Sheets (MSDS); and
- 1246 • Maintains hazardous materials control by authorized user, zone, and task.

1247 The tracking system provides the data necessary to meet reporting requirements, assess processes
1248 for pollution prevention opportunities, and measure success in minimizing hazardous materials
1249 usage (Tinker AFB 2006a).

1250 Tinker AFB's OC-ALC Plan 19-2 Spill Prevention and Emergency Response Plan for Hazardous
1251 and Extremely Hazardous Material and Spill Prevention Control and Countermeasures Plan
1252 (Tinker AFB 2004) presents specific procedures for preparing for and responding to inadvertent
1253 discharges of oil or releases of hazardous substances at the base. In 2002, Tinker AFB
1254 developed the Storm Water Pollution Prevention Program (SWPPP) to comply with the
1255 conditions of the DEQ Multi-Sector General Permit (MSGP) for Storm Water Discharges
1256 Associated with Industrial Activities and DEQ Phase II Small Municipal Separate Storm Sewer
1257 System (MS4). The SWPPP provides base-wide and facility-specific Best Management
1258 Practices (BMPs) to reduce pollutants in stormwater discharges from the base. The BMPs for
1259 Tinker AFB include:

- 1260 • Source controls;
- 1261 • Management practices;
- 1262 • Preventive maintenance;
- 1263 • Spill prevention and response;
- 1264 • Erosion and sediment controls; and
- 1265 • Identification of stormwater pollution prevention personnel.

1266 **3.6.2.2 Fuel Storage**

1267 The fuels and materials stored and handled in bulk at the base include JP-5, JP-8 (aviation fuel),
1268 JP-10 (missile fuel), Mogas (automotive gasoline), PF-1, diesel fuel, biodiesel fuel, calibration
1269 fluid and de-icing fluid. Conoco supplies JP-8 fuel to Tinker AFB through a 6-inch supply line
1270 that enters the northern section of the base and continues to the main tank farm (Tinker AFB
1271 2005a). Tanker trucks are used as a backup to deliver JP-8, which is dispensed to aircraft either
1272 from eleven R-11 refuelers or directly through hydrants on the aprons on the west, south, and
1273 east sides of the base. An estimated 54 percent of aircraft refueling is done through hydrants and

1274 the remaining 46 percent is by trucks. Approximately 50 percent of defueling is done by
1275 hydrants and approximately 50 percent is by trucks (Tinker AFB 2006a).

1276 Various fuels at the base are also stored in ASTs and USTs. Releases from ASTs and USTs
1277 (i.e., spills, overfill and leaks) can cause fires or explosions that threaten human safety and can
1278 contaminate soil and groundwater that threaten human health. The main goal of the base's
1279 storage tank program is to protect groundwater and soil from contamination by ensuring that:

- 1280 • all ASTs meet all applicable requirements including requirements for leak testing and
1281 preventing, responding to, reporting, and cleaning up spills;
- 1282 • new USTs (including piping) are designed and constructed to provide the following:
1283 corrosion protection, release detection, spill and overfill prevention, proper installation,
1284 and secondary containment; and
- 1285 • all existing USTs (any regulated UST installed before 22 December 1988) are upgraded
1286 to meet the standards for new USTs (Tinker AFB 2005a).

1287 An aggressive investigation of abandoned and active USTs at Tinker AFB began in September
1288 1985. Eighty-eight active tanks and 38 abandoned tanks were identified and located. Most of
1289 those tanks were found in the vicinity of Building 3001 and in the north central portion of the
1290 base near B201, B210 and the B290 Fuel Farm.

1291 As of 31 July 1999, 26 sites were established with the Oklahoma Corporation Commission
1292 (OCC) to investigate releases from USTs. Tinker AFB has completed the majority of the
1293 investigations for determining the nature and extent of contamination at each UST site; several of
1294 those sites are in active remediation. Currently, fifteen of the activated sites have been closed or
1295 deactivated in accordance with OCC regulations that were in effect prior to 1 September 1996.
1296 These previous rules used a system that categorized UST sites for remediation based on generic
1297 contaminant levels in soils and groundwater. On 1 July 1996, the OCC issued new rules that
1298 classify sites for remediation based on risk to human health and the environment. The process is
1299 referred to as the Oklahoma Risk-Based Corrective Action (ORBCA) Program. Eleven sites are
1300 still open and are in remediation or have been recommended for case closure. In addition, two
1301 UST removals were performed in 1998, and tank closure reports were submitted to the OCC in
1302 December 1998 for each site. According to the ECAMP FY 2006 Final Report, Tinker AFB
1303 currently maintains 36 active USTs and 90 active ASTs (Tinker AFB 2006a).

1304 No USTs or ASTs are known to have been installed at the proposed project site or at the
1305 Alternative 1 site.

1306 **3.6.2.3 Environmental Restoration Program**

1307 The Defense Environmental Restoration Program (DERP) was established by Section 211 of the
1308 Superfund Amendments and Reauthorization Act of 1986 (SARA). It is a single program,
1309 funded by several accounts, that provides for the cleanup of hazardous substances associated

1310 with past DoD activities and is consistent with the provisions of CERCLA, as amended. Three
1311 program categories have been established under DERP: Installation Restoration Program (IRP),
1312 Other Hazardous Waste (OHW), and Building Demolition/Debris Removal (BD/DR). The
1313 USAF subsequently established its ERP, in 1996, to locate and investigate hazardous waste sites,
1314 known as IRP sites, on its installations. Tinker AFB began its IRP in 1980, with a total of 40
1315 IRP sites including landfills, fire training pits, radioactive waste disposal sites, fuel storage areas,
1316 industrial waste pits, and the IWTP identified at Tinker AFB since the beginning of the IRP
1317 (Tinker AFB 2005a). A total of 23 of the IRP sites are addressed under RCRA guidance and
1318 four are addressed under CERCLA as operable units on the NPL. Seventeen of the 40 sites have
1319 been closed, and no further action is required.

1320 No IRP sites are located in the vicinity of the proposed project site or Alternative 1 site.

1321 **3.7 Visual Resources**

1322 **3.7.1 Definition of Resource**

1323 Visual resources are defined as the natural and manufactured features that comprise the aesthetic
1324 qualities of an area. These features form the overall impressions that an observer receives of an
1325 area or its landscape character. Landforms, water surfaces, vegetation, and manufactured
1326 features are considered characteristic of an area if they are inherent to the structure and function
1327 of a landscape.

1328 **3.7.2 Existing Conditions**

1329 **3.7.2.1 Regional Visual Character**

1330 Tinker AFB is located in the Central Red Bed Plains section of Oklahoma. Topography of this
1331 section of Oklahoma is characterized by gently rolling to nearly level uplands. Tinker AFB is
1332 situated on a broad area of uplands that forms a watershed divide. The visual characters of the
1333 Oklahoma City area are consistent with other cities in the Central United States, ranging from
1334 tall buildings in the Oklahoma City downtown area to large agricultural and residential
1335 properties in more rural areas. Properties adjacent to Tinker AFB vary widely and include, but
1336 are not limited to, commercial, industrial, residential, and vacant properties.

1337 **3.7.2.2 Visual Resources at Tinker AFB and the Proposed Project Location**

1338 Tinker AFB has a visual character typical of a military aviation complex with a mixture of large
1339 industrial facilities and hangars, as well as smaller structures for administrative and support
1340 functions. A network of roadways and sidewalks provide routes for vehicle and pedestrian
1341 traffic. Various outdoor recreation areas including the Urban Greenway consisting of a 110-acre
1342 wildlife and nature corridor, a golf course, athletic fields, bicycle paths, and other facilities are
1343 available for the base's population. Tinker AFB utilizes the USAF Architectural Compatibility
1344 Guide developed in 2003 to guide the planning and design of facilities at the base to ensure
1345 building materials, design, signage, and landscape components are incorporated into new

1346 facilities and site improvements to present a cohesive and visually pleasing image (Tinker AFB
1347 2005a).

1348 Facilities within the seven architectural districts vary in character as a result of land use and
1349 function. The landscape of Tinker AFB is primarily composed of ornamental trees, shrubs, and
1350 turf grass and varies from areas with large mature trees and shrubs to areas with little or no
1351 landscaping depending on the function of the area. Areas of the natural landscape, including
1352 such resources as wetlands, greenways, and riparian corridors, have been preserved for their
1353 ecological significance as well as to enhance the attractiveness of the base.

1354 The proposed project site is a vacant, field situated in the airfield environment surrounded by
1355 taxiways and runways. Alternative 1 ATCT site is also located in the airfield environment.
1356 Visual resources at both sites can be considered characteristic of an active military airfield.

1357 **3.8 Safety**

1358 **3.8.1 Definition of Resource**

1359 The primary safety concern with regard to military aircraft activity is the potential for aircraft
1360 mishaps (i.e., crashes), which may be caused by mid-air collisions with other aircraft or objects,
1361 weather difficulties, or bird-aircraft strikes, or on-ground collisions between aircraft. A properly
1362 sited ATCT, at Tinker AFB, is required to provide air traffic controllers a clear view of the
1363 runways, taxiways, traffic patterns, alert areas, restricted areas, and parking aprons to ensure
1364 adequate and safe airborne and ground traffic control on and around the airfield. The tower must
1365 have adequate space for air traffic control operations, controller administrative functions,
1366 personnel training, crew briefings, electronic equipment maintenance, radio and telephone
1367 support equipment, and environmental controls.

1368 **3.8.2 Existing Conditions**

1369 **3.8.2.1 ATCT at Tinker AFB**

1370 The existing ATCT facility, B935, was designed and built in 1970 to accommodate only ATC
1371 operations and included space to accommodate limited ATCT equipment of that era. Since the
1372 tower's establishment, the structural, mechanical, and electrical components of the ATCT facility
1373 have deteriorated to the point that repairs are often required. The control tower, as currently
1374 sited, violates the current Air Force siting criteria since it is located less than 1,000 feet from the
1375 runway centerline. The building has been deemed substandard and is not adequately configured
1376 to allow renovation to incorporate all current ATCT operations functions. The ATCT cab is also
1377 not current with the National Fire Protection Association's (NFPA) Life and Safety Code, NFPA
1378 101, and seismic requirements for USAF ATCTs.

1379 The tower cab, by today's standards, is too small and cramped to accommodate all the occupants
1380 and trainees. The 2004 Air Traffic System Evaluation by AFMC/HQ identified the control tower
1381 cab as too small for current operations: "The size and noise level in the tower cab is far from
1382 ideal in accommodating the five control positions. During the evaluation period, as many as

1383 12 people were in the tower cab performing official duties and if measures are not taken to limit
1384 the number of people or modify/replace the tower cab, the noise level and attendant distractions
1385 may lead to an erosion of the quality of ATC service.”

1386 Three additional safety concerns are associated with the existing control tower:

- 1387 • Fire suppression system- the current tower lacks adequate fire suppression and
1388 evacuation systems;
- 1389 • Personal safety- the highest set of stairs leading to the tower cab is steep and not very
1390 deep. Several controllers have fallen or lost their footing and slid down the steps. One
1391 controller was disabled from work for several months with a head injury stemming from
1392 a stairway fall. The new USAF standard tower does not contain these types of stairs; and
- 1393 • Structural inadequacy- when wind speeds exceed 60 knots (69 mph), evacuation of the
1394 control tower is required. Current USAF standard towers are designed to withstand wind
1395 speeds of 88 knots (101 mph).

1396 The building has been deemed substandard and is not adequately configured to allow renovation
1397 to incorporate all current ATCT operations functions.

1398 **3.8.2.2 Runway Protection Zones**

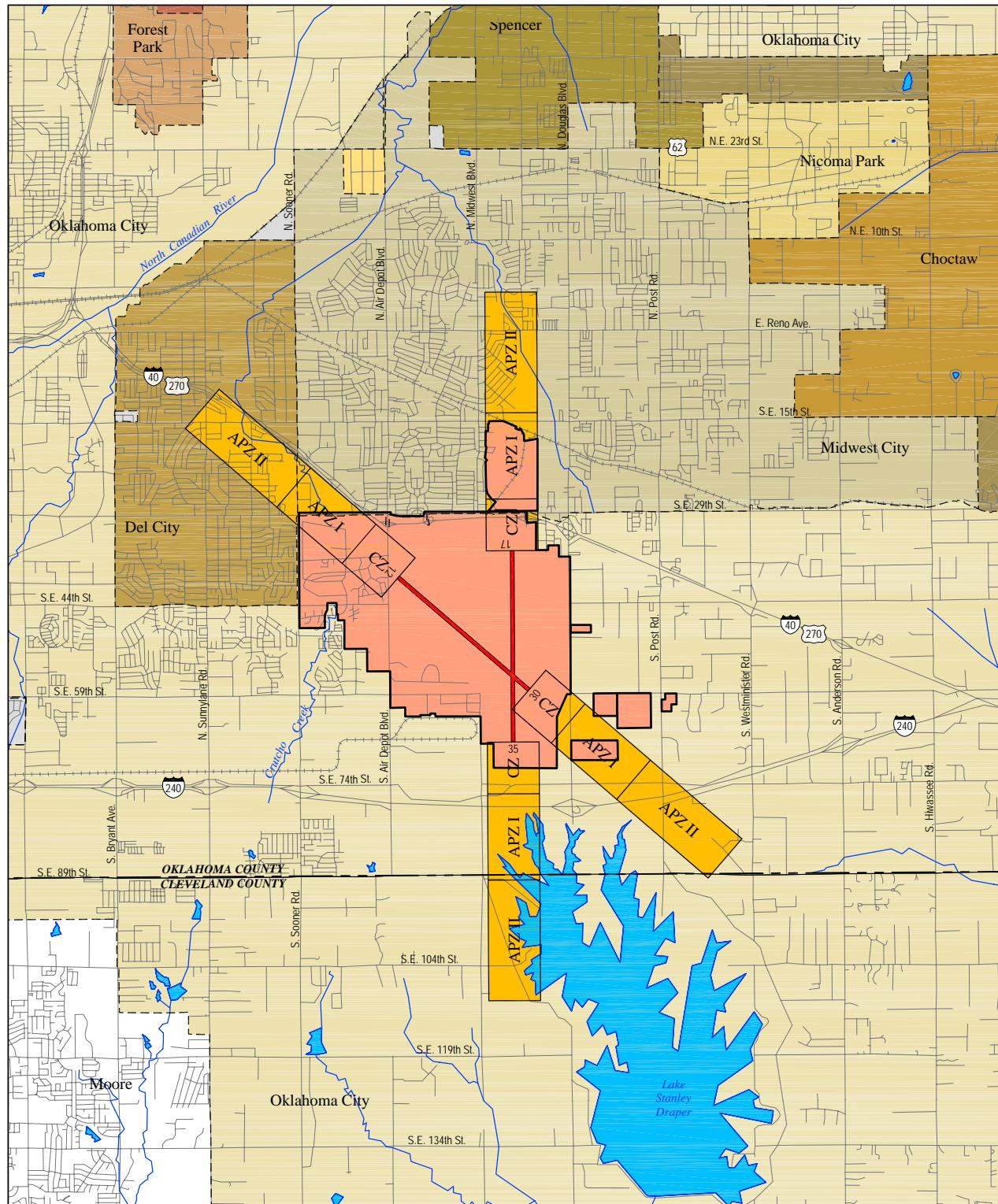
1399 Accident Potential Zones (APZs) and Clear Zones (CZs) are rectangular zones extending
1400 outward from the ends of active military airfields that delineate those areas recognized as having
1401 the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. The CZs and
1402 APZs for Runways 17/35 and 12/30 at Tinker AFB are depicted in Figure 3-9. Each end of
1403 Runway 17/35 at Tinker AFB has a 3,000 foot by 3,000 foot CZ and two APZs, while each end
1404 of Runway 12/30 has a 3,000 foot by 3,000 foot CZ and single 3,000 foot wide by 5,000 foot-
1405 long APZ (Tinker AFB 2006b). Neither the proposed project site nor ATCT Alternative 1 site
1406 are located in either APZs or CZs (Figure 3-9).

1407 ***Clear Zones***

1408 The CZ has the highest accident potential of the three zones, as 27 percent of accidents studied
1409 occurred in this area. As stated previously, it is USAF policy to request that Congress authorize
1410 and appropriate funds to purchase the real property interests in this area to prevent incompatible
1411 land uses. Currently at Tinker AFB, all land use with CZs would be considered compatible
1412 (Tinker AFB 2006b).

1413 ***Accident Potential Zones I and II***

1414 APZ I is an area that possesses somewhat less accident potential than the CZ, with 10 percent of
1415 the accidents studied occurring in this zone. APZ II has less accident potential than APZ I, with 6
1416 percent of the accidents studied occurring in this zone. While the potential for aircraft accidents
1417 in APZs I and II does not warrant land acquisition by the USAF, land-use planning and controls
1418 are strongly encouraged in these areas for the protection of the public (Tinker AFB 2006b).



LEGEND

- Runway
- Roadway
- - - City Limits
- Tinker AFB
- CZ Clear Zone
- APZ Accident Potential Zone

0 8,000
Feet

Source: Tinker AFB 2006a

EA

Clear Zones and Accident Potential Zones Construction of Air Traffic Control Tower Tinker Air Force Base

FIGURE
3-9

1420 APZ I is 3,000 ft wide by 5,000 ft and has land use compatibility guidelines that are sufficiently
1421 flexible to allow reasonable economic use of the land, such as industrial/manufacturing,
1422 transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture.
1423 APZ II, also 3,000 ft wide, is 7,000 ft long extending to 15,000 ft from the runway threshold.
1424 Acceptable uses include those of APZ I, as well as low density single family residential and
1425 those personal and business services and commercial/retail trade uses of low intensity or scale of
1426 operation. High density functions such as multi-story buildings, places of assembly (e.g.,
1427 theaters, churches, schools, restaurants, etc.), and high density office uses are not considered
1428 appropriate (Tinker AFB 2006b).

1429 Incompatible land use is currently established within APZs associated with the airfield at Tinker
1430 AFB and is summarized in Table 3-3. APZs I and II located off Runways 17 and 12 contain
1431 commercial and sensitive receptors (i.e., residences, schools, libraries, etc.), respectively.

**Table 3-3 Acres of Incompatible Land Use within Clear Zones,
Accident Potential Zones I and II Associated with Runways 12/30 and 17/35**

Land Use	Acres of Incompatible Land Use		
	CZ	APZ I	APZ II
Residential	0	4	408
Commercial	0	41	0
Industrial	0	0	0
Public/Quasi-public	0	4	121
Recreational/Open Space/Agricultural/Low Density	0	0	0
Total	0	49	529

1434 Source: Tinker AFB 2006b.

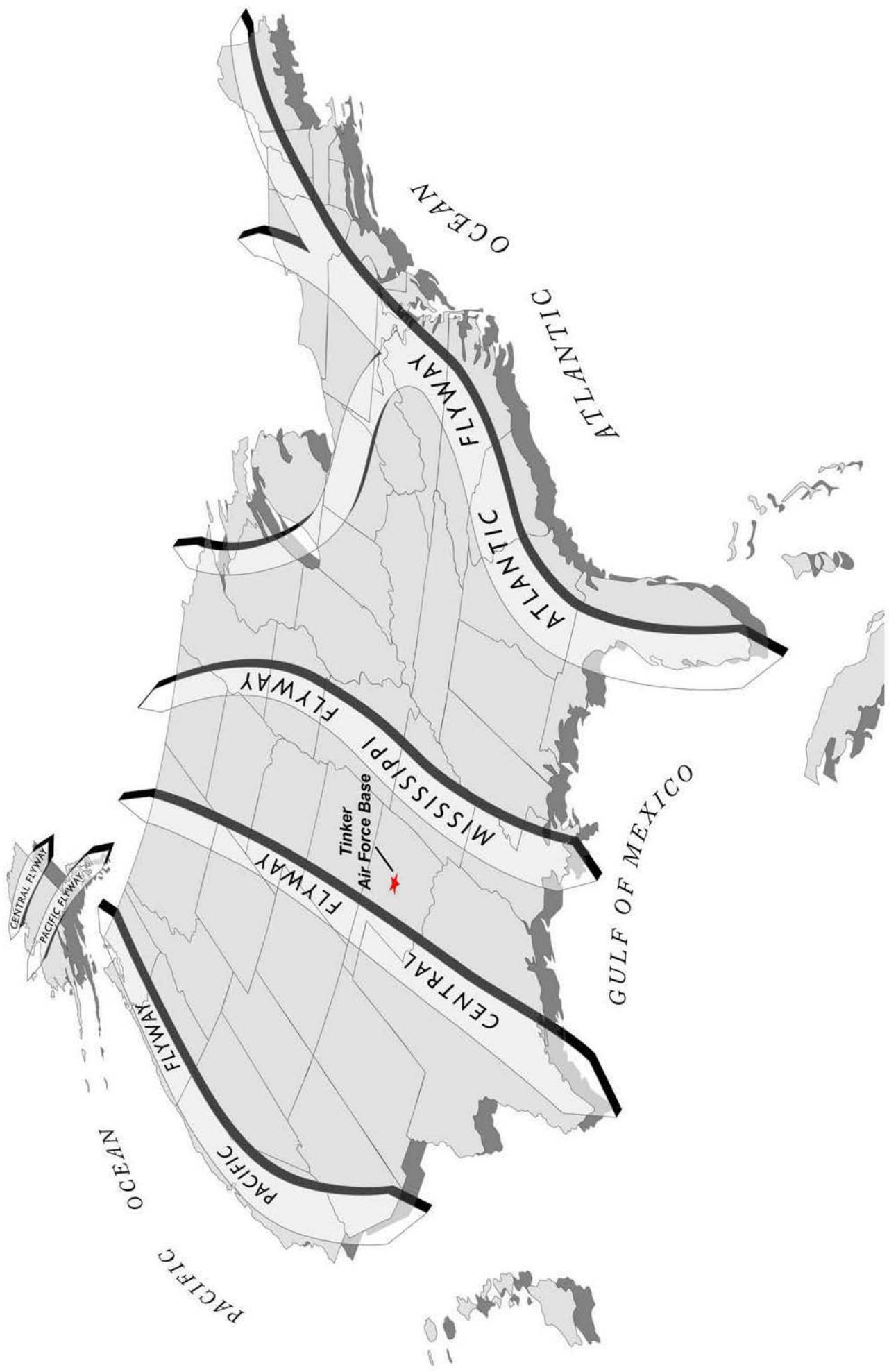
3.8.2.3 Bird-Aircraft Strike Hazard

1436 BASH is defined as the threat of aircraft collision with birds or other wildlife during flight
1437 operations and is a safety concern at all airfields due to the frequency of aircraft operations and
1438 the possibility of encountering birds at virtually all altitudes. Most birds fly close to ground
1439 level; correspondingly, more than 95 percent of all reported bird-strikes occur below 3,000 ft
1440 AGL. At most military installations, about half of reported bird strikes occur in the immediate
1441 vicinity of the airfield and another 25 percent occur during low-altitude local training exercises.

1442 Bird-aircraft strikes present a potential threat to Tinker AFB aircraft and aircrew safety due to
1443 resident bird species as well as the installation's proximity to Lake Stanley Draper and the bird
1444 migratory route known as the Central Flyway (Figure 3-10).

FIGURE
3-10

Migratory Flyways Over the United States



EA

1446 According to BASH data, 27 reported bird-strikes have occurred since 2000 at or in the
1447 immediate vicinity of Tinker AFB (Table 3-4) (Tinker AFB 2006c). The USAF BASH Team
1448 has developed bird avoidance models to predict and minimize the probability of hitting
1449 waterfowl and raptors within the base area; the team's studies show the relative bird-strike
1450 possibility according to the time of year, time of day, and phase of flight. Late fall and winter
1451 months show higher rates for bird-strike probability. Waterfowl strike potential is highest in the
1452 night, while raptor strike potential is highest during midday. Bird-strike potential is also higher
1453 during landing and low level phases of flight.

1454 **Table 3-4 Bird-Strike Occurrence for Tinker AFB (2000-2005)**

	2000	2001	2002	2003	2004	2005
Total	5	7	5	4	2	4

1455 Source: Tinker AFB 2006c.

1456 In order to minimize the potential for bird-strokes, Tinker AFB has contracted the U.S.
1457 Department of Agriculture (USDA)-Wildlife Services to conduct all live bird control on the base,
1458 which includes two full-time professional bird-control staff to provide round-the-clock coverage.
1459 A *BASH Plan* (2006) has also been implemented, key elements of which include (Tinker AFB
1460 2006c):

- 1461 • establishment of a Bird Hazard Working Group which designates responsibilities and
1462 establishes of procedures that aid supervisors in preventative actions intended to reduce
1463 bird-strike hazards;
- 1464 • provision of appropriate channels for timely dissemination of bird hazard information and
1465 procedures for avoidance of such hazards (e.g., migratory flocks); and incorporation of
1466 standardized guidelines for reporting bird sightings and strikes.

1467 **3.9 Noise and Vibration**

1468 **3.9.1 Definition of Resource**

1469 **3.9.1.1 Noise**

1470 Noise is defined as unwanted sound or, more specifically, as any sound that is undesirable
1471 because it interferes with communication, is intense enough to damage hearing, or is otherwise
1472 annoying (Federal Interagency Committee on Noise [FICON] 1992). Human response to noise
1473 can vary according to the type and characteristics of the noise source, the distance between the
1474 noise source and the receptor, the sensitivity of the receptor, and the time of day.

1475 Due to the wide range in sound levels, sound is expressed in decibels (dB), a unit of measure
1476 based on a logarithmic scale. A 10-dB increase in noise level corresponds to a 100-percent
1477 increase (or doubling) in perceived loudness. As a general rule, a 3-dB change is necessary for
1478 noise increases to be noticeable to humans (Bies and Hansen 1988). Sound measurement is
1479 further refined by using an A-weighted decibel scale that emphasizes the range of sound

1480 frequencies that are most audible to the human ear (i.e., between 1,000 and 8,000 cycles per
1481 second). Unless otherwise noted, all decibel measurements presented in this EA are A-weighted
1482 (dBA).

1483 Day-night average sound level (L_{dn}) is a noise metric that averages A-weighted sound levels over
1484 a 24-hour period, with an additional 10-dB penalty added to noise events occurring between
1485 10:00 p.m. and 7:00 a.m. This penalty is intended to compensate for generally lower background
1486 noise levels at night and the additional annoyance of nighttime noise events. L_{dn} is the preferred
1487 noise metric of the US Department of Housing and Urban Development (HUD), the US
1488 Department of Transportation (USDOT), Federal Aviation Administration (FAA), USEPA,
1489 Veterans' Administration, and US Department of Defense (DoD).

1490 Two of the primary factors that reduce levels of environmental sounds are increasing the distance
1491 between the sound source and the receiver and having intervening obstacles such as walls,
1492 buildings or terrain features that block the direct path between the sound source and the receiver.
1493 Factors that act to increase the loudness of environmental sounds include moving the sound
1494 source closer to the receiver, sound enhancements caused by reflections, and focusing caused by
1495 various meteorological conditions.

1496 Table 3-5 identifies noise levels associated with some common indoor and outdoor activities and
1497 settings and indicates the subjective human judgments of noise levels, specifically the perception
1498 of noise levels doubling or being halved. For reference purposes, a baseline noise level of 70 dB
1499 is described as moderately loud. As can be seen in the table illustrating the logarithmic dB scale,
1500 humans perceive an increase of 10 dB as a doubling of loudness, while an increase of 30 dB
1501 corresponds with an eight-fold increase in perceived loudness.

1502 **Table 3-5 Sound Levels of Typical Noise Sources and Noise Environments**

Noise Source (at a given distance)	A-Weighted Sound Level Scale (dBA)	Noise Environment	Human Judgment of Noise Loudness ¹
Military Jet Takeoff with Afterburner (50 ft)	140		
Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
Commercial Jet Takeoff (200 ft)	120		<u>Threshold of Pain</u>
Pile Driver (50 ft)	110	Rock Music Concert	32 times as loud 16 times as loud
Ambulance Siren (100 ft)	100		<u>Very Loud</u>
Newspaper Press (5 ft)			8 times as loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	4 times as loud
Prop. Plane Flyover (1,000 ft)		Printing Press Plant	
Diesel Truck, 40 mph (50 ft)			

1503 **Table 3-5 Sound Levels of Typical Noise Sources and Noise Environments (Continued.)**

Noise Source (at a given distance)	A-Weighted Sound Level Scale (dBA)	Noise Environment	Human Judgment of Noise Loudness ¹
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	2 times as loud
Passenger Car, 65 mph (25 ft)			<u>Moderately Loud</u>
Living Room Stereo (15 ft)	70		
Vacuum Cleaner (3 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	1/2 as loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban	<u>Quiet</u>
		Ambient Sound	1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible
	10		Threshold of Hearing

1504 ¹Relative to a reference loudness of 70 dBA.

1505 ft = feet

1506 Source: FICON 1992.

1507 **3.9.1.2 Noise in the Airfield Environment**

1508 **Aircraft Operations.** Analyses of aircraft noise exposure and compatible land use around DoD
 1509 facilities are normally accomplished using a group of computer-based programs, collectively
 1510 called NOISEMAP (USAF 1992). NOISEMAP, through its program BASEOPS, allows entry of
 1511 runway coordinates, airfield information, flight tracks, flight profiles (e.g., engine thrust settings,
 1512 altitudes, and speeds) along each flight track for each aircraft, numbers of flight operations, run-
 1513 up coordinates, run up profiles, and run up operations. The model's output comprises a regularly
 1514 spaced "grid" file containing L_{dn} values. The NMPLLOT program uses the grid file to plot
 1515 contours of equal L_{dn} , which can then be overlaid onto maps to depict current noise exposure
 1516 levels in the Tinker AFB airfield environment. In airport noise analyses, noise contours are used
 1517 to help determine compatibility of aircraft operations and local land use.

1518 Noise levels from flight operations exceeding ambient background noise typically occur beneath
 1519 main approach and departure corridors, near local air traffic patterns around the airfield, and in
 1520 areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft take off and
 1521 gain altitude, their noise contribution drops.

1522 **Engine Test and Maintenance Runs.** Although noise resulting from aircraft flight operations
 1523 represents the greatest contribution to the overall noise environment near the airfield, engine run-
 1524 ups may also influence total ambient noise levels. Pre-flight engine run-ups and aircraft
 1525 maintenance activities are typically confined to the aircraft parking ramps and engine test areas.

1526 **3.9.1.3 Vibrations**

1527 *Vibration* is an oscillatory motion which can be described in terms of the displacement, velocity,
1528 or acceleration. Because the motion is oscillatory, there is no net movement of the vibration
1529 element and the average of any of the motion descriptors is zero. *Displacement* is the easiest
1530 descriptor to understand. For a vibrating floor, the displacement is simply the distance that a
1531 point on the floor moves away from its static position. The velocity represents the instantaneous
1532 speed of the floor movement and acceleration is the rate of change of the speed. Vibration is an
1533 oscillatory motion through a solid medium in which the motion's amplitude can be described in
1534 terms of displacement, velocity or acceleration.

1535 Vibration is normally associated with activities such as railroads or vibration-intensive stationary
1536 sources but can also be associated with construction equipment such as jackhammers, pile
1537 drivers, and hydraulic hammers. *Vibration displacement* is the distance that a point on a surface
1538 moves away from its original static position. The instantaneous speed a point on a surface
1539 moves is described as the velocity, and the rate of change of the speed is described as the
1540 acceleration. Each of these descriptors can be used to correlate vibration to human response,
1541 building damage, and acceptable equipment vibration levels. During project construction, the
1542 operation of construction equipment can cause ground-borne vibration. Analysis of this type of
1543 vibration is best measured in velocity and acceleration (FTA 2006).

1544 The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to
1545 describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the
1546 vibration signal and RMS is defined as the square root of the average of the squared amplitude of
1547 the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is
1548 typically more suitable for evaluating human response (FTA 2006).

1549 **3.9.2 Existing Conditions**

1550 **3.9.2.1 Regional Setting**

1551 The noise environment of communities surrounding Tinker AFB is characteristic of a moderately
1552 dense developed urban area, with some areas of undeveloped land south of the base. The urban
1553 developed setting typically experiences noise associated with vehicles on highways, railways,
1554 aircraft, or industrial activities. Undeveloped areas typically experience noise associated with
1555 local highways, aircraft, or light industrial activities. According to FICON, the following
1556 communities have the indicated typical ranges of outdoor L_{dn} noise levels: *Rural*, 40 to 48 L_{dn} ;
1557 *Small Town and Quiet Suburban*, 45 to 55 L_{dn} ; *Urban Residential*, 58 to 62 L_{dn} ; *Suburban and*
1558 *Low Density Urban*, 52 to 60 L_{dn} ; and *Noisy Urban Residential* 63 to 67 L_{dn} (FICON 1992).
1559 Civilian areas adjacent to the airfield support residential, commercial, public/quasi-public and
1560 open/agricultural/low density. Much of the area surrounding the base to the north, east, and west
1561 contains moderately dense residential, while areas to the south are sparsely populated with noise
1562 levels of correspondingly low magnitude. Tinker AFB aircraft activity is the dominant noise

1563 producer in the region with residences and an elementary school present within the 65+ L_{dn}
1564 contour.

1565 **3.9.2.2 Tinker AFB and Proposed Project Location**

1566 According to the 2006 Air Installation Compatible Use Zone (AICUZ) Study, 65 to 75 L_{dn} noise
1567 contours associated with aircraft operations extend beyond the boundary of Tinker AFB to the
1568 north and 65 to 80 L_{dn} noise contours extend off base to the south. Noise contours are
1569 concentrated around Runway 17/35, the primary runway at the base. Runway 17/35 is aligned in
1570 a north-south direction, which allows aircraft to takeoff and land over relatively unpopulated
1571 areas to the south such that higher noise levels occur over areas which do not support sensitive
1572 noise receptors or noise-sensitive land uses. Off the ends of Runway 17/35, the 65 L_{dn} noise
1573 contour extends approximately three and four miles beyond the base boundary to the north and
1574 south, respectively. The entire 85+ L_{dn} noise contour is within the base boundary. Acreage
1575 impacted by aircraft operations at Tinker AFB is summarized in Table 3-6 (Tinker AFB 2006b).

1576 **Table 3-6 Noise Exposure Acreage from Aircraft Operations at Tinker AFB**

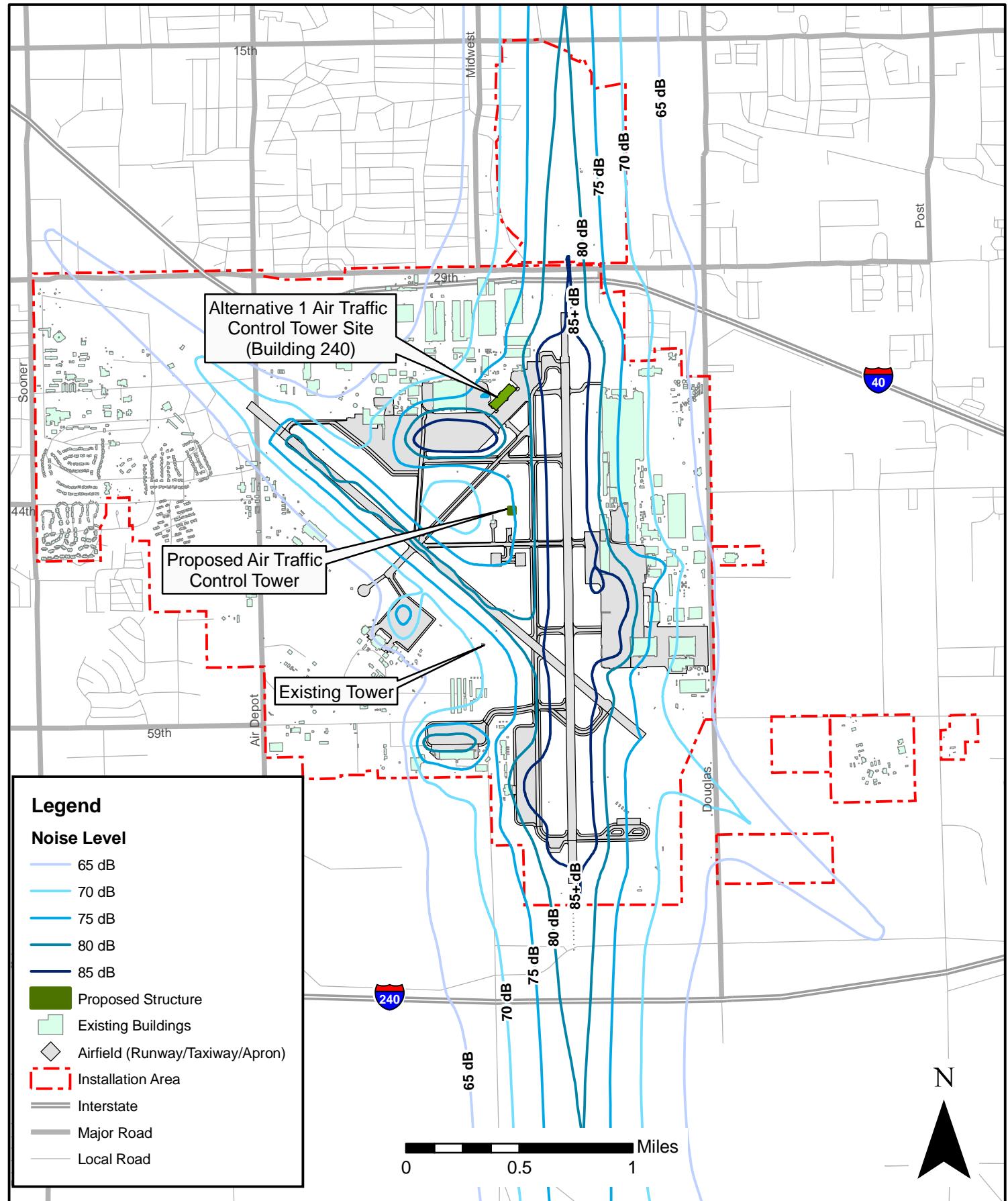
Noise Level	Acreage Beyond Base Boundary	Total Acreage
65-69	3,710	4,391
70-74	1,239	1,978
75-79	549	1,203
80+	75	844
Total > 65	5,573	8,416

1577 Source: Tinker AFB 2006b.

1578

1579 The Proposed Action site lies between the 75-80L_{dn} contour lines (Figure 3-11). The Alternative
1580 1 sites fall between the 75-80L_{dn} (Building 240) (Figure 3-11).

1581 Current vibration levels at Tinker AFB are the result of aircraft operations both, during aircraft
1582 departures and aircraft engine maintenance and test runs. Vibration levels are short-term during
1583 aircraft departures and occur during engine maintenance and test runs at higher power settings
1584 (military power and afterburner), which varies depending on engine type. The majority of
1585 maintenance and test engine runs occurring at the higher power settings take place in areas with
1586 noise suppression with the exception of those that take place on the two trim pads located in
1587 between the two active runways. The T-10 hush house is approximately 400 feet (ft) from the
1588 proposed ATCT. Although vibration levels associated with engine tests at afterburner within the
1589 hush house would likely be slightly perceptible, it is unlikely that they would significantly
1590 exceed vibrations levels experienced within the proposed ATCT. Off-base receptors are not
1591 exposed to vibration levels from Tinker AFB aircraft operations that exceed background
1592 vibration levels (Figure 3-11). Human response to vibration is depicted in Table 3-7.



EA

Baseline Noise Level Contours
Construction of Air Traffic Control Tower
Tinker Air Force Base

FIGURE
3-11

1594

Table 3-7 Human Response to Vibration

1595

Response Level	Peak Particle Velocity (inches per second)
Imperceptible	0.001 to 0.01
Slightly Perceptible	0.01 to 0.03
Distinctly Perceptible	0.03 to 0.1
Strongly Perceptible	0.1 to 0.3
Disturbing	0.3 to 0.93
Very Disturbing	0.93 +

1596

Source: American National Standards Institute 1983, Wiss 1981

1597

3.9.2.3 Noise Abatement Procedures

1598

Avoidance of noise-sensitive areas is emphasized and takeoff patterns are routed to avoid these locations as much as possible. For example, the majority of departures and approaches occur on Runway 17/35 to avoid populated areas. Also, efforts are made to control and schedule missions to keep noise levels low, especially at night. Twelve noise complaints were registered in 2005 and 8 noise complaints were registered as of 4 December 2006 at Tinker AFB; however, these complaints cannot be exclusively attributed to aircraft operations associated with based aircraft and transient military aircraft also utilize Tinker AFB's airfield (Tinker AFB 2006b).

1605

1606
1607

SECTION 4 ENVIRONMENTAL CONSEQUENCES

1608 This section evaluates the potential environmental consequences resulting from implementation
1609 of the Proposed Action or alternatives. Analyses are presented by resource area, as presented in
1610 *Section 3, Affected Environment.*

1611 **4.1 Air Quality**

1612 **4.1.1 Approach to Analysis**

1613 The 1990 Amendments to the CAA require that federal agency activities conform to the SIP with
1614 respect to achieving and maintaining attainment of NAAQS and addressing air quality impacts.
1615 The USEPA General Conformity Rule requires that a conformity analysis be performed which
1616 demonstrates that a Proposed Action does not: 1) cause or contribute to any new violation of any
1617 NAAQS in the area; 2) interfere with provisions in the SIP for maintenance or attainment of any
1618 NAAQS; 3) increase the frequency or severity of any existing violation of any NAAQS; or 4)
1619 delay timely attainment of any NAAQS, any interim emission reduction, goals, or other
1620 milestones included in the SIP for air quality. A conformity review must be performed when a
1621 federal action generates air pollutants in a region that has been designated a nonattainment or
1622 maintenance area for one or more NAAQS. Nonattainment areas are geographic regions where
1623 the air quality fails to meet the NAAQS. Maintenance areas are regions where NAAQS were
1624 exceeded in the past, and are subject to restrictions specified in a SIP-approved maintenance plan
1625 to preserve and maintain the newly regained attainment status. Provisions in the General
1626 Conformity Rule allow for exemptions from performing a conformity determination if the total
1627 net increase in emissions of individual nonattainment or maintenance area pollutants resulting
1628 from implementation of the Proposed Action fall below the significant (*de minimis*) threshold
1629 values.

1630 **4.1.2 Impacts**

1631 **4.1.2.1 Proposed Action**

1632 Pollutant emissions associated with implementation of the Proposed Action at Tinker AFB
1633 would include construction emissions (i.e., fugitive dust emissions) generated during ground
1634 disturbance and related site preparation activities and combustion emissions from vehicles and
1635 heavy-duty equipment used during construction of the new building and parking area. However,
1636 construction emissions would be temporary and would not occur beyond completion of
1637 construction activities. Oklahoma County is in an Early Action Compact Agreement with
1638 USEPA for the 8-hour ozone standard and is designated as an *attainment* area in compliance
1639 with all NAAQS.

1640 **Construction Emissions**

1641 *Dust Emissions*

1642 Under implementation of the Proposed Action, dust (i.e., PM₁₀, a criteria pollutant) would be
1643 generated during construction activities including vegetation removal, grading, and demolition.
1644 Dust emissions can vary substantially daily depending on levels of activity, specific operations,
1645 and prevailing meteorological conditions. Based on similar studies at other facilities the
1646 expected emission rate is 1.2 tons of dust generated per acre per month of activity (USEPA
1647 1995). Based on this dust-generation factor and the maximum estimated acreage that could be
1648 disturbed at any one time, (e.g., simultaneous ground-disturbing of 0.05 acres for the ATCT
1649 footprint, 0.17 acres for access road, 0.17 acres for the parking lot, and 0.05 acres for
1650 construction staging) a projected total of approximately 0.45 acres could be disturbed which
1651 would generate approximately 0.54 tons of dust; this estimate is conservatively high and is based
1652 on the highly unlikely scenario that all proposed construction would occur within a one-month
1653 time period.

1654 Increased PM₁₀ emissions resulting from proposed construction activities would comprise short-
1655 term adverse impacts that could be mitigated through standard dust minimization practices, such
1656 as watering exposed soils, soil stockpiling, and soil stabilization. After initial site preparation
1657 and grading activities are completed, dust emissions would be significantly less, and once
1658 operational, long-term emissions from developed facilities would be negligible.

1659 *Combustion Emissions*

1660 Combustion emissions associated with construction-related vehicles and equipment would be
1661 minimal because most vehicles would be driven to and kept at the affected site for the duration
1662 of construction activities. Furthermore, as is the case with PM₁₀ emissions associated with site
1663 preparation activities, emissions generated by construction equipment would be temporary and
1664 short-term.

1665 **Operational Emissions**

1666 Implementation of the Proposed Action would not result in any additions to personnel; therefore,
1667 no additional combustion emissions related to personnel transportation would result. Given that
1668 the proposed ATCT would house equipment currently in use in the existing ATCT, no new
1669 equipment that would have substantial emissions would be introduced. Therefore, a Prevention
1670 of Significant Deterioration (PSD) permit is not required. Emissions generated by
1671 implementation of the Proposed Action are expected to be below *de minimis* levels.

1672 **4.1.2.2 Alternative 1: Alternative Siting for ATCT**

1673 Implementation of Alternative 1 would result in the remodel of an existing building and would
1674 not result in either significant ground-disturbing activities or construction emissions. Similar to
1675 the Proposed Action, no additions to personnel would occur; therefore, no additional operational
1676 emissions would result from implementation of this alternative. In addition, the alternative
1677 ATCT site would house existing ATCT equipment; therefore, no additional equipment that
1678 would introduce new or generate substantial emissions would be introduced. Impacts to air
1679 quality would be expected to be below *de minimis* levels.

1680 **4.1.2.3 Alternative 2: No-Action Alternative**

1681 If the No-Action Alternative were selected, the new ATCT building would not be constructed.
1682 Therefore, conditions would remain as described in *Section 3.1, Air Quality* and use of existing
1683 equipment in current configurations would continue; therefore, no impacts to Air Quality would
1684 occur.

1685 **4.2 Water Resources**

1686 **4.2.1 Approach to Analysis**

1687 Significance criteria for water resources impacts are based on water availability, quality, and use;
1688 existence of floodplains; and associated regulations. An impact to water resources would be
1689 significant if it would 1) reduce water availability to or interfere with the supply of existing
1690 users; 2) create or contribute to overdraft of groundwater basins or exceed safe annual yield of
1691 water supply sources; 3) adversely affect water quality or endanger public health by creating or
1692 worsening adverse health hazard conditions; 4) threaten or damage unique hydrologic
1693 characteristics; or 5) violate established laws or regulations that have been adopted to protect or
1694 manage water resources of an area including wetlands. Impacts of flood hazards on Proposed
1695 Actions are significant if such actions are proposed in areas with high probabilities of flooding.

1696 **4.2.2 Impacts**

1697 **4.2.2.1 Proposed Action**

1698 **Surface Water**

1699 The Proposed Action would involve new construction on currently undeveloped ground. This
1700 would increase the potential for soil erosion during construction, resulting in possible adverse
1701 impacts on water quality. Construction would require that a SWPPP be submitted by the
1702 contractor to Tinker AFB and would include BMPs to minimize pollution from construction.
1703 Contaminants, such as petroleum hydrocarbons, in run-off from developed areas of the site,
1704 including industrial areas or parking lots, could impact water quality in the area. These impacts
1705 would be minimized assuming existing non-point source pollution requirements are met and spill
1706 prevention and response procedures are implemented at the site. Furthermore, implementation

1707 of BMPs, (e.g., silt fencing, berm construction around construction sites, etc.), would minimize
1708 this potential to negligible impacts during construction. Over the long-term, no operations that
1709 would affect surface water are anticipated to occur.

1710 The increase in impermeable surface at the site would be mitigated through the construction of
1711 stormwater control mechanisms, such as stormwater retention ponds or channeling stormwater
1712 flows to non-flood prone areas. Discharges of pollutants by stormwater from parking lots would
1713 be eliminated or minimized to the maximum extent practicable. Stormwater control features
1714 would be included in the design to eliminate trash, debris, oil/grease, and other pollutants
1715 commonly found in parking lots and industrial areas. Furthermore, introduction of new
1716 impermeable surfaces would be offset by the reintroduction of permeable surfaces (i.e., grass) at
1717 the existing ATCT site following its demolition. Therefore, implementation of the Proposed
1718 Action would not have adverse impacts to surface water.

1719 **Groundwater**

1720 The Proposed Action site does not overlie any known groundwater contamination. It is unlikely
1721 that groundwater quality would adversely affect or be affected by constructing a new facility on
1722 this site assuming required controls on the handling of hazardous materials and for spill
1723 prevention and cleanup are implemented to protect groundwater. Also, the proposed building
1724 and parking area does not comprise a significant water user or wastewater generator. Finally, the
1725 project site does not overlie an identified groundwater recharge zone of special significance and
1726 the footprint of facility development is an extremely small component in comparison with the
1727 total acreage of the base; therefore, the footprint of facility development is negligible with regard
1728 to groundwater area below the region. Therefore, implementation of the Proposed Action would
1729 not have an adverse impact on groundwater resources.

1730 **Wetlands**

1731 Implementation of the Proposed Action would not eliminate, modify, or otherwise impact any
1732 existing wetlands on Tinker AFB. Therefore, implementation of the proposed action would not
1733 have an adverse impact on wetlands.

1734 **Floodplains**

1735 No 100-year or 500-year floodplains have been identified on the site identified for the Proposed
1736 Action. The increase in impermeable surfaces at the site by the construction of the proposed
1737 parking lot and the building footprint, considered negligible with relationship to the size of the
1738 entire watershed, would be mitigated through the construction of stormwater control
1739 mechanisms, such as stormwater retention ponds or channeling stormwater flows to non-flood
1740 prone areas. Furthermore, since the current ATCT facility is located in a USACE and FEMA
1741 designated 100-year floodplain, removal of the current ATCT facility and installation of open
1742 grass would add permeable surface back to the existing floodplain. Therefore, relocating the
1743 ATCT facility to the proposed site would benefit the 100-year floodplain.

1744 **4.2.2.2 Alternative 1: Alternative Siting for ATCT**

1745 Implementation of Alternative 1 would involve remodeling an existing building and would not
1746 negatively impact water resources conditions. This alternative would also involve the
1747 reintroduction of permeable surfaces (i.e., grass) at the existing ATCT site following its
1748 demolition. Therefore, implementation of Alternative 1 would not result in adverse impacts to
1749 surface water. Further, since the current ATCT facility is located in a USACE- and FEMA-
1750 designated 100-year floodplain, removal of the current ATCT facility and installation of open
1751 grass would reinstate permeable surface to the existing floodplain. Therefore, relocating the
1752 ATCT facility to the proposed site would result in beneficial impacts to the 100-year floodplain.

1753 **4.2.2.3 Alternative 2: No-Action Alternative**

1754 If the No-Action Alternative were selected, proposed construction activities would not be
1755 implemented and water resources – including floodplains – conditions would remain unchanged
1756 from their current status, as described in *Section 3.2*. Selection of the No-Action Alternative
1757 would not further impact regional or local water resources and would not contribute permeable
1758 surfaces to the 100-year floodplain, where the current ATCT facility is located.

1759 **4.3 Biological Resources**

1760 **4.3.1 Approach to Analysis**

1761 Determination of the significance of potential impacts to biological resources is based on 1) the
1762 importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the
1763 proportion of the resource that would be affected relative to its occurrence in the region; 3) the
1764 sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications.
1765 Impacts to biological resources are significant if species or habitats of foremost concern are
1766 adversely affected over relatively large areas or disturbances cause reductions in population size
1767 or distribution of a species of high concern.

1768 USFWS data, ODWC data, and the Tinker AFB *Integrated Natural Resources Management Plan*
1769 were reviewed to determine the presence or potential occurrence of sensitive species and habitats
1770 in the study area. Potential physical impacts such as habitat loss, noise, and impacts to surface
1771 water were evaluated to assess potential impacts to biological resources resulting from
1772 implementation of the Proposed Action and identified alternatives.

1773 **4.3.2 Impacts**

1774 **4.3.2.1 Proposed Action**

1775 Impacts to biological resources are expected to be negligible. The wildlife habitat that would be
1776 cleared for construction is of relatively low quality. Wildlife habitat of higher quality exists to
1777 the north, south, and east of the proposed location. Therefore, individual animals that may be
1778 displaced by construction could easily find more desirable habitat a short distance away.

1779 Implementation of the Proposed Action would negligibly affect the wildlife species that may
1780 forage or transit the site. These species are common and mobile; therefore, these wildlife species
1781 could easily avoid direct impacts from the construction activities and forage in nearby
1782 unimproved areas. Also, the Proposed Action would occur in an area already disturbed by noise
1783 and heavy activity associated with flight and airfield operations. Operations at the facility would
1784 occur indoors and thus away from potential encounters with wildlife; therefore, no long-term
1785 impacts to wildlife would occur under the proposed action.

1786 **4.3.2.2 Alternative 1: Alternative Siting for ATCT**

1787 Implementation of Alternative 1 at this site would involve remodeling an existing building and
1788 would not occur within any areas currently used by wildlife. Alternative 1 would occur in an
1789 area already disturbed by noise and heavy activity associated with flight and airfield operations.
1790 Operations at the facility would occur indoors, away from potential encounters with wildlife.
1791 Therefore, no impacts to biological resources would be expected.

1792 **4.3.2.3 Alternative 2: No-Action Alternative**

1793 If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed
1794 Action. Therefore, no impacts to existing biological resources, as described in Section 3.3,
1795 would result from selection of the No-Action Alternative.

1796 **4.4 Transportation and Circulation**

1797 **4.4.1 Approach to Analysis**

1798 Potential impacts to transportation and circulation are assessed with respect to anticipated
1799 disruption or improvement of current transportation patterns and systems; deterioration or
1800 improvement of existing levels of service; and changes in existing levels of transportation safety.
1801 Beneficial or adverse impacts may arise from the physical changes to circulation (e.g., closing,
1802 rerouting, or creating roads), construction activity, introduction of construction-related traffic on
1803 local roads, or changes in daily or peak-hour traffic volumes created by installation workforce or
1804 population changes. Adverse impacts on roadway capacities would be significant if roads with
1805 no history of exceeding capacity were forced to operate at or above their full design capacity.

1806 **4.4.2 Impacts**

1807 **4.4.2.1 Proposed Action**

1808 **Construction-Related Impacts**

1809 The Proposed Action project site is located in the general area of the existing Engine Hushhouse,
1810 B926, north of the existing Control Tower, in proximity to midfield. This location is
1811 approximately 1,750 feet west of the Runway 17/35 centerline and 7,500 feet east of the Runway
1812 17 Threshold. Implementation of the Proposed Action would require delivery of materials to

1813 construction sites and introduction of construction-related equipment and vehicles. However,
1814 construction traffic would make up only a small portion of the total existing traffic volume
1815 region base, and many of the construction vehicles would be driven to and kept on site for the
1816 duration of construction, resulting in very few actual increased trips. Furthermore, increases in
1817 traffic volumes associated with construction activity would be short-term; upon completion of
1818 construction, no long-term impacts to transportation systems would result.

Operation-Related Impacts

1820 Implementation of the Proposed Action would redirect current ATCT facility employees from
1821 B935, north to the proposed ATCT site. The majority of vehicle traffic associated with the
1822 proposed ATCT would enter the base via Tinker, Eaker, and Vance Gates. Personnel would
1823 access the new ATCT via an existing, active taxiway. Personnel will follow the same safety
1824 procedures currently in use for any vehicles entering an active airfield including access to active
1825 taxiways and runways. The Proposed Action includes an approximately 24-space parking area to
1826 accommodate 33 employees. The USAF has established guidelines (AFI 32-1084) intended to
1827 ensure that adequate parking is available at USAF installations; according to these standards, the
1828 ratio of available parking spaces to personnel should be no less than 38 percent of the largest
1829 shift of civilian employees; in this case, that acceptable ratio mandates just 13 spaces. With the
1830 re-routing of 33 employees, there would be minimal impact to transportation and circulation in
1831 this area and base-wide.

4.4.2.2 Alternative 1: Alternative Siting for ATCT

1833 Implementation of Alternative 1 would redirect current ATCT traffic from B935 (existing
1834 ATCT) to B240 (Alternative 1 siting). Currently, traffic near B240 is heavy; therefore,
1835 implementation of Alternative 1 could increase traffic and circulation problems in this part of the
1836 base. Furthermore, increases in traffic volumes associated with construction activity would be
1837 short-term; upon completion of construction, minimal impacts to transportation systems would
1838 result. Parking already exists in the area; therefore, this alternative would not create onsite
1839 parking deficiencies.

4.4.2.3 Alternative 2: No-Action Alternative

1841 If the No-Action Alternative were selected, Tinker AFB would not implement the construction
1842 project. Therefore, no changes to transportation, parking, or circulation would occur.

4.5 Cultural Resources

4.5.1 Approach to Analysis

1845 Cultural resources are subject to review under both federal and state laws and regulations.
1846 Section 106 of the NHPA of 1966 empowers the Advisory Council on Historic Preservation to
1847 comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or
1848 eligible for inclusion on the NRHP.

1849 Once cultural resources have been identified, significance evaluation is the process by which
1850 resources are assessed relative to significance criteria for scientific or historic research, for the
1851 general public, and for traditional cultural groups. Only cultural resources determined to be
1852 significant (i.e., eligible for the NRHP) are protected under the NHPA.

1853 Analysis of potential impacts to cultural resources considers both direct and indirect impacts.
1854 Direct impacts may occur by 1) physically altering, damaging, or destroying all or part of a
1855 resource; 2) altering characteristics of the surrounding environment that contribute to resource
1856 significance; 3) introducing visual, audible, or atmospheric elements that are out of character
1857 with the property or alter its setting; or 4) neglecting the resource to the extent that it deteriorates
1858 or is destroyed.

1859 Direct impacts can be assessed by identifying the types and locations of Proposed Actions and
1860 determining the exact locations of cultural resources that could be affected. Indirect impacts
1861 primarily result from the effects of project-induced population increases and the resultant need to
1862 develop new housing areas, utility services, and other support functions necessary to
1863 accommodate population growth. These activities and facilities' subsequent use can disturb or
1864 destroy cultural resources.

1865 **4.5.2 Impacts**

1866 **4.5.2.1 Proposed Action**

1867 No NRHP-listed or eligible archaeological resources have been recorded on the site. However,
1868 the slight potential exists for currently buried remains to be uncovered during ground-disturbing
1869 activities (i.e., construction and expansion of facilities). If such resources were uncovered during
1870 development of the proposed project, activities would be suspended and Tinker AFB will consult
1871 with the Oklahoma SHPO to determine the significance of the resource(s).

1872 There are no known federally recognized Native American lands or resources at Tinker AFB.
1873 Tinker AFB has started consultations with three Native American tribes (Seminole Nation,
1874 Osage Nation, and Muskogee Nation). They have verbally commented that they have no
1875 NAGPRA or AIRFA concerns. Additionally, they have communicated that Tinker AFB property
1876 is not suitable for religious or burial sites (Tinker AFB 2001).

1877 If Native American lands or resources are determined to be present near the proposed project
1878 location, activities would be suspended until a qualified archaeologist and Native American
1879 representative could determine the significance of the resource(s). Therefore, based on
1880 information currently available, the proposed project would not impact cultural resources.

1881 **4.5.2.2 Alternative 1: Alternative Siting for ATCT**

1882 Tinker AFB's ICRMP requires that to the maximum extent feasible, NRHP-eligible buildings or
1883 structures be used rather than simply demolished (Tinker AFB 2005c). Implementation of
1884 Alternative 1 would involve remodeling Building 240, built in 1942 and eligible for listing on the

1885 NRHP. The actions involved with the building remodel would have an adverse affect on the
1886 historic building. The potential for an inadvertent discovery of buried cultural material is
1887 unlikely during the building remodel. If any remains were uncovered all activity would be
1888 suspended until a qualified archaeologist could determine the significance of the resource(s).
1889 Based on information currently available, implementation of Alternative 1 would have an
1890 adverse impact on cultural resources.

1891 **4.5.2.3 Alternative 3: No-Action Alternative**

1892 Under the No-Action Alternative the construction project would not be conducted; therefore, no
1893 impacts to cultural resources would occur under implementation of this alternative.

1894 **4.6 Hazardous Materials and Wastes**

1895 **4.6.1 Approach to Analysis**

1896 Numerous local, state, and federal laws regulate the storage, handling, disposal, and
1897 transportation of hazardous materials and wastes; the primary purpose of these laws is to protect
1898 public health and the environment. The significance of potential impacts associated with
1899 hazardous substances is based on their toxicity, ignitability, and corrosivity. Impacts associated
1900 with hazardous materials and wastes would be significant if the storage, use, transportation, or
1901 disposal of hazardous substances substantially increases the human health risk or environmental
1902 exposure.

1903 **4.6.2 Impacts**

1904 **4.6.2.1 Proposed Action**

1905 The purpose of the Proposed Action is to increase the efficiency of ATCT facility. The
1906 increased efficiency would ultimately result in the demolition of the current ATCT facility. The
1907 existing facility may contain asbestos and lead building materials, and consequently the
1908 demolition of the existing ATCT facility would result in the generation of regulated waste.
1909 Regulated waste would be transported offsite by licensed contractor for disposal.

1910 A diesel-powered generator would be utilized by the proposed ATCT facility to serve as a
1911 backup power source. However, since no external fuel storage tank would be required, no
1912 hazardous materials would be stored at the proposed facility. Therefore, only negligible
1913 temporary impacts involving hazardous materials and wastes would occur as a result of the
1914 Proposed Action.

1915 **4.6.2.2 Alternative 1: Alternative Siting for ATCT**

1916 Impacts resulting from the implementation of Alternative 1 would be the same as the Proposed
1917 Action; an increase in the volume of regulated wastes generated could occur during the
1918 demolition of the existing ATCT. However, the increased volume would be temporary. Only
1919 negligible impacts involving hazardous wastes would occur as a result of this alternative.

1920 **4.6.2.3 Alternative 2: No-Action Alternative**

1921 If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed
1922 Action. Therefore, no impacts with regard to hazardous materials would occur and conditions
1923 would remain as described in *Section 3.6*.

1924 **4.7 Visual Resources**

1925 **4.7.1 Approach to Analysis**

1926 Determination of the significance of impacts to visual resources is based on the level of visual
1927 sensitivity in the area. Visual sensitivity is defined as the degree of public interest in a visual
1928 resource and concern over adverse changes in the quality of that resource. In general, an impact
1929 to a visual resource is significant if implementation of the Proposed Action would result in
1930 substantial alteration to an existing sensitive visual setting.

1931 **4.7.2 Impacts**

1932 **4.7.2.1 Proposed Action**

1933 The proposed ATCT Facility would be visually consistent with existing structures and activities
1934 at the installation and in the vicinity of the proposed project site. Furthermore, given that the
1935 visual environment of Tinker AFB does not constitute a unique or sensitive viewshed, no
1936 detrimental impact to regional visual resources would occur upon implementation of the
1937 Proposed Action.

1938 **4.7.2.2 Alternative 1: Alternative Siting for ATCT**

1939 Impacts resulting from the implementation of Alternative 1 would be the same as the Proposed
1940 Action; overall visual characteristics at the installation and views from off site areas would not
1941 be affected with implementation of this alternative. The visual environment of Tinker AFB does
1942 not constitute a unique or sensitive viewshed; therefore, impacts to regional visual resources
1943 would be negligible under Alternative 1.

1944 **4.7.2.3 Alternative 3: No-Action Alternative**

1945 No impacts to existing visual resources at or in the vicinity of Tinker AFB would occur if the
1946 No-Action Alternative were selected and visual resources conditions would remain as described
1947 in *Section 3.7*.

1948 **4.8 Safety**

1949 **4.8.1 Approach to Analysis**

1950 Determination of the significance of potential impacts to safety is based on the level of increased
1951 risks associated with aircraft mishap potential or flight safety relevant to the public or the
1952 environment. For example, if an action involved an increase in aircraft operations such that

1953 mishap potential would increase significantly, air safety would be compromised. Conversely,
1954 beneficial impacts would include those reducing exposure to mishaps.

1955 **4.8.2 Impacts**

1956 **4.8.2.1 Proposed Action**

1957 The existing ATCT facility is over 35 years old and was designed to accommodate only ATC
1958 operations and with limited equipment space. The required numbers of personnel, combined
1959 with the required equipment upgrades, continue to reduce the available space in the cab, which is
1960 unsuitable for day-to-day operations. The overcrowded conditions jeopardize flying safety and
1961 delay flying operations. The demands placed on the existing tower make it unsuitable for further
1962 growth and degrade the adequacy of the work environment. Flight safety, as well as the safety of
1963 moving aircraft or vehicles on airfield surfaces, would remain impaired. The existing ATCT
1964 facility violates current Air Force siting criteria because it is located less than 1,000 feet from the
1965 runway centerline, within the primary airfield surface which comprises surfaces of the runways,
1966 runway shoulders, and lateral safety zones. The length of the primary surface extends 200 feet
1967 beyond each end of the runway; the width of the primary surface is 2,000 feet (1,000 feet each
1968 side of the runway centerline). This placement within the primary airfield surface presents a
1969 safety risk. Therefore, implementation of the Proposed Action would benefit the safety of flying
1970 operations at Tinker AFB and the surrounding communities.

1971 An additional major concern is the lack of fire suppression and evacuation systems in the current
1972 ATCT currently including a set of stairs, leading to the tower cab, that are steep and not very
1973 deep. Several controllers have fallen or lost their footing and slid down the stairs. The new,
1974 standard ATCT has a set of stairs that is safe for day-to-day operations as well as for fire
1975 evacuation and as a secondary egress system. Unlike the current ATCT, the new ATCT design
1976 complies with applicable AF directives, MIL HDBK 1008c *Fire Protection for Facilities,*
1977 *Engineering, Design, and Construction*, National Fire Codes, NFPA 101, and the *Uniform*
1978 *Building Code* (UBC). The current ATCT design creates tower evacuation when winds exceed
1979 60 knots (69 mph). The new ATCT will be designed to withstand sustained wind speeds of
1980 88 knots (101 mph) and would allow personnel to safely remain in the control tower at higher
1981 wind speeds than structural conditions currently permit. Therefore, the implementation of the
1982 Proposed Action would benefit both personnel and structure safety.

1983 **Accident Protection Zones**

1984 All proposed construction activities identified in the Proposed Action have been designed and
1985 sited to comply with all airfield safety criteria and are consistent with guidelines established in
1986 the base's *Master Plan*. No facilities development is proposed within airfield CZs or APZs;
1987 Furthermore, implementation of the Proposed Action would not result in a change in shape or
1988 shift in location of established CZs or APZs. Current land use incompatibilities exist within
1989 APZs I and II off Runways 17 and 12, respectively; however, no new incompatible land use
1990 would be introduced as a result of implementation of the Proposed Action.

1991 The majority of vehicle traffic associated with the proposed ATCT would enter the base via
1992 Tinker, Eaker, and Vance Gates. Personnel would access the new ATCT via an existing, active
1993 taxiway. Personnel will follow the same safety procedures currently in use for any vehicles
1994 entering an active airfield including access to active taxiways and runways. Therefore, no
1995 adverse impacts to airfield safety would result from implementation of the Proposed Action.

1996 **4.8.2.2 Alternative 1: Alternative Siting for ATCT**

1997 Implementation of Alternative 1 would involve remodeling Building 240 to include the proposed
1998 ATCT. This location would provide adequate visibility of all airfield movement areas except the
1999 munitions ramp, which is not currently visible. In addition, siting the ATCT in this location
2000 would allow the aircraft traffic pattern to remain in a standard configuration, passing in front of
2001 the controllers. Therefore, no adverse impacts to airfield safety would be expected from
2002 implementation of Alternative 1.

2003 **4.8.2.3 Alternative 3: No-Action Alternative**

2004 If the No-Action Alternative were selected, unsafe conditions would continue in the existing
2005 ATCT facility. Therefore, safety conditions would remain as described in *Section 3.8, Safety* and
2006 implementation of this alternative would be considered adverse to safety.

2007 **4.9 Noise and Vibration**

2008 **4.9.1 Approach to Analysis**

2009 Noise and vibration impact analyses typically evaluate potential changes to existing conditions
2010 that could result from implementation of a Proposed Action. Potential changes may be
2011 beneficial if they reduce the number of sensitive receptors exposed to unacceptable noise or
2012 vibration levels. Conversely, changes may be detrimental if they result in increased exposure to
2013 unacceptable noise and vibration levels. An increase in noise and vibration levels due to
2014 introduction of a new noise source can create an impact on the surrounding environment to both
2015 persons and structures on- and off-base.

2016 The human reaction to various levels of noise and vibration is highly subjective, and varies from
2017 person to person. Specific vibration levels have the potential to damage structures; however,
2018 damage is dependent on numerous factors including vibration level, structure construction,
2019 duration of exposure, etc.

2020 Vibration levels associated with proposed T-10 hush house operations and impact evaluation on
2021 the proposed ATCT were determined using previous T-10 hush house studies and steady-state
2022 vibration principles.

2023 **4.9.2 Impacts**

2024 **4.9.2.1 Proposed Action**

2025 Implementation of the proposed ATCT site would not result in additional noise and vibrations beyond the construction phase. The ATCT site is located within the airfield and would be subjected to noise and vibration levels consistent with airfield operations, including T-10 hush house operations. However, these levels would not adversely impact the control tower structure or ATCT operations or personnel.

2030 Currently, noise exposure of 65 Ldn or higher associated with total military aircraft operations at Tinker AFB affects approximately 5,544 acres beyond the base boundary. The off-base area affected by noise levels of 65 Ldn or greater would not increase upon implementation of the Proposed Action. Implementation of the Proposed Action would not increase noise exposure within the base boundary.

2035 According to the USAF, a significant noise impact would occur if analysis shows that the Proposed Action would cause noise-sensitive areas to experience increased noise exposure to unacceptable levels. Implementation of the Proposed Action would not result in any sensitive receptors (e.g., residences, schools, etc.) currently within the baseline 65+ Ldn and higher contours to experience an increase in sound levels. Therefore, impacts to the surrounding community and on-base receptors at Tinker AFB would not be significant.

2041 Established criteria for noise associated with a T-10 hush house suggest that sound levels should not exceed 89 dBA anywhere beyond a 250-foot radius, which is sufficient to alleviate any health concerns related to audible noise (Oak Ridge National Laboratory no date). Given that this separation criterion is a USAF requirement and the proposed ATCT is approximately 400 feet (ft) from the hush house, sound levels from proposed operations would not be detrimental to those who work within or operations associated with the proposed ATCT.

2047 **T-10 Hush House Vibration**

2049 A significant impact from vibration would occur if analysis determined that the Proposed Action would cause persons or structures in on- or off-base areas to experience unacceptable vibration levels or if vibration levels would detrimentally affect the proposed project. Unacceptable vibrations levels could result in annoyance to persons and damage to structures.

2053
2054 An acceleration (g) of 0.01 is recommended as a threshold for structural impacts as long-term structural damage may occur for wall accelerations greater than 0.01 g (Bolz and Tuve 1976; Witten 1987). One study at Langley AFB of a F100-PW-100 engine operating at maximum power (afterburner) within a T-10 hush house resulted in an acceleration of approximately 0.002 to 0.005 g at 10 to 15 Hz and a distance of 400 ft from the rear of the hush house (i.e., in the direction of the engine exhaust) (Goerke et al. 1990). Given these values and incorporating steady-state vibration principles, a displacement of approximately 0.0002 inches and peak

2061 particle velocity (PPV) of 0.012 to 0.021 inches/second would be expected. A PPV of 0.012 to
2062 0.021 inches/second is below Maximum Allowable Ground Motion at Structures from Blasting
2063 Activities and “Slightly Perceptible” according to the American National Standards Institute
2064 (ANSI) Allowable Continuous/Intermittent Vibration Levels from 7:00 AM to 10:00 PM (ANSI
2065 1983). The structure closest to Building 926 (the T-10 hush house) would be the proposed
2066 ATCT, located approximately 300 ft east of both the engine test stand within the hush house and
2067 end of the augmenter tube. Given the proposed ATCT location relative to the engine test stand
2068 within the hush house and the augmenter tube (90 degree angle), sound pressure levels would be
2069 anticipated to be reduced by approximately 10 percent below what would be experienced directly
2070 behind the engine test stand and augmenter tube (180 degrees) (Lee 1982). Also, afterburner use
2071 would occur for approximately 300 seconds per day, but afterburner use would not exceed a 5-
2072 second continuous period. Power settings below afterburner would occur more frequently but
2073 would result in a lower PPV (i.e., reduced vibrations) when compared to afterburner settings.
2074 Given the distance and angle of the proposed ATCT in relation to the location of Building 926,
2075 impacts associated with vibration levels would be negligible. This would result in a further
2076 reduction in PPV than presented above. Given the distance and angle of the proposed ATCT in
2077 relation to the location of Building 926, no detrimental impacts associated with vibration levels
2078 would occur to the control tower structure or ATCT operations or personnel.
2079

2080 Although vibration levels associated with engine tests at afterburner within the hush house would
2081 likely be slightly perceptible, it is unlikely that they would significantly exceed current vibrations
2082 levels experienced within the ATCT (i.e., those associated with afterburner departures of aircraft
2083 whose engines are not suppressed). No chronic or acute human health impacts would be
2084 expected to occur. Levels of vibration sufficient to cause human discomfort or annoyance may
2085 occur during engine testing in the afterburner mode; however, duration and frequency of these
2086 tests are typically 300 seconds, once per day but not for more than a 5-second continuous period
2087 (Oak Ridge National Laboratory 1993). Therefore, impacts to persons from vibrations
2088 associated with T-10 hush house operations would not be detrimental.

2089 **Construction-Related Noise**

2090 Implementation of the Proposed Action would have minor, temporary effects on the noise
2091 environment in the vicinity of Building 926 during construction activities associated with ATCT.
2092 Use of heavy equipment for the construction of the ATCT would generate noise exposure similar
2093 to existing ambient levels at the base. Noise generation would be typical of construction
2094 activities, short-term, and occur during normal working hours (i.e., between 7:00 AM and
2095 5:00 PM). Therefore, noise generated by construction of the ATCT associated with
2096 implementation of the Proposed Action would not impact sensitive receptors on or in the vicinity
2097 of Tinker AFB.

2098 **4.9.2.2 Alternative 1: Alternative Siting for ATCT**

2099 Implementation of Alternative 1 would involve remodeling Building 240 to include the proposed
2100 ATCT. The location would provide adequate visibility of all airfield movement areas except the

2101 munitions ramp, which is not currently visible. In addition, siting the ATCT in this location
2102 would allow the aircraft traffic pattern to remain in a standard configuration, passing in front of
2103 the controllers. Building 240 is not currently subjected to noise and vibration levels associated
2104 with T-10 hush house operations. Therefore, impacts associated with noise and vibration would
2105 not be expected to occur under implementation of this alternative.

2106 **4.9.2.3 Alternative 2: No-Action Alternative**

2107 If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed
2108 Action. Therefore, conditions would remain as described in *Section 3.9, Noise and Vibration*
2109 and no impacts would occur.

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SECTION 5 CUMULATIVE IMPACTS

2113 Cumulative impacts on environmental resources result from incremental impacts of the Proposed
2114 Action when combined with other past, present, and reasonably foreseeable future projects in an
2115 affected area. Cumulative impacts can result from minor but collectively substantial actions
2116 undertaken over a period of time by various agencies (federal, state or local) or persons. In
2117 accordance with the National Environmental Policy Act, the cumulative impacts resulting from
2118 projects that are proposed, under construction, recently completed, or anticipated to be
2119 implemented in the near future are discussed below.

2120 Projected projects occurring in other areas of Tinker AFB and in the vicinity of Tinker AFB for
2121 the next five years are included in Table 5-1.

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Table 5-1 Projects Occurring at or near Tinker AFB.

DMRT Three Bay Hangar	Construction of a three-bay, multi-aircraft fuel-capable hangar sized for KC-135, E-3, B-1, B-52, and KC-X (Next generation) tanker aircraft. The facility is proposed for construction west of B2280 (which is located on the industrial east side of the base). The new facility is required as part of the Programmed Depot Maintenance (PDM) for KC-135. Workload and repairs for this aircraft take place in three separate facilities that are inadequate in size. The new hangar is required to adequately address these issues and also to consolidate workload and function, improving efficiency.
Military Family Housing Privatization	Air Force implementation of the privatization initiative which involves leasing of all housing areas to a private developer for 50 years. The Air Force also will convey all 694 existing military units to the developer and depending on the alternative selected the developer would implement a combination of demolition, renovation, and /or construction of housing units to meet the end-state requirement of 660 housing units. Once privatization is implemented, the developer will own, operate, and manager all housing units on the installation while leasing the land underlying the housing communities (approximately 224 acres) for a period of 50 years. Depending on the developer, there will be a combination of demolition, renovation, and new construction distributed throughout the military family housing areas. Included will be alternatives to desired community features such as a sound protection buffer along Sooner, lighted tennis and basketball courts, and an outdoor fitness area.
Relocate 137 Airlift Wing of Air National Guard	The relocation of operations and maintenance personnel associated with the 137 Airlift Wing (AW) of the Air National Guard from Will Rogers Air Guard Station (AGS) to Tinker AFB, where the 137 AW will become an associative wing, operating with the 507 th Air Refueling Wing of the Air Force Reserve Command. Although the 137 AW currently operates eight C-130 cargo aircraft, those aircraft will not follow the 137 AW to Tinker AFB but rather relocated to Pope AFB in Fayetteville, North Carolina. Construction of Air Force Reserve Command and Air National Guard squadron operations, operations support squadron, life support storage, and life support work area will be completed to support the relocation.

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Table 5-1 Projects Occurring at or near Tinker AFB (continued)

Transfer 939 Air Reserve Wing to Tinker AFB	The transfer of four KC-135R aircraft from the 939 Air Reserve Wing from Portland International Airport AGS to Tinker AFB. To implement this action, Tinker AFB has proposed the construction of a new hangar with hangar access and associated demolition of Building 1037 and Building 1041, which would also correct a current deficiency at Tinker AFB
DLA Warehouse	Construction of a 167,575 square foot, permanent, non-combustible, general purpose warehouse with a 25' clear stack height, weather sealed door trucks, loading/unloading docks with dock levelers, paved roadways, and connection. The facility will require steam heat from the Central Heat Plant or boiler. All electrical, mechanical, and fire protection system will meet national, state, and local code requirements. Annex shall house a 123 square meter administrative area with a lunch/break area, restrooms, and locker rooms. A utility annex shall house all the utility functions for this facility. There are 18 depots within the continental US, most of which are located on active military bases. These depots support the mission of the Military Installation on which they are located. These Depots also store general commodities. Base Realignment and Closure (BRAC) identified the requirement for construction of additional warehouses at the Defense Distribution Depot Oklahoma City (located at Tinker AFB). This is a BRAC requirement.
Construct Medical Clinic	Construction of a new medical clinic, approximately 172,000 sq ft in the open land area northeast of Gott Gate. The new facility will replace the existing clinic and would result in the demolition of the Central Plant, which contains both the chillers and boilers that service the clinic. Demolition of the boiler would also result in de-commissioning an underground diesel storage tank. This proposed project will also include a medical squadron building as well as the War Readiness Materials warehouse. The new clinic will house doctors' offices, exam and treatment rooms, laboratories, radiology, pharmacy, dental clinic, conference and training rooms, as well as storage areas. Energy to operate the new boilers will include a combination of diesel fuel, stored in above ground storage tank and natural gas. The existing medical clinic will also be demolished (approximately 184,000 square feet). Upon completion of the new facilities, the existing medical clinic and TRICARE facility (B5803) will also be demolished.
Child Development Center	Construction of a new Child Development Center in the southwest portion of the Base, north of Southeast 59 th Street and northwest of Gott Gate in the South Forty Area. Size of the facility would be approximately 32,877 square feet. The proposed action would be located approximately 375 feet west of Air Depot Road and approximately 100 feet north of the base fence line. Approximately 130 feet of the Urban Greenway Multi-Use Trail would be removed and re-routed as a result. The new Child Development Center will provide for the care and training of dependent children of both military and civilian personnel assigned to the base. The building will contain areas for child activities, staff support, facility support, core administration, and maintenance. 2.1 acres of land will be required surrounding the facility.
Tinker Aerospace Complex (TAC)	Demolish 39 substandard and deteriorated facilities on Tinker AFB and relocate select depot-level aircraft maintenance functions from those facilities to the former General Motors (GM) Assembly Plant adjacent to Tinker AFB. Tinker AFB would lease the former GM property as well as obtain access to a city-owned parcel that would connect Tinker AFB to the new property. Multiple construction projects are proposed to provide access to and secure the perimeter of the Tinker Aerospace Complex.

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Table 5-1 Projects occurring at or near Tinker AFB (continued)

Harry Twaddle Acquisition	The U.S. Army Reserve's 95th Division (Institutional Training) would move to Fort Sill. The facility is based at the Major General Harry Twaddle U.S. Armed Forces Reserve Center, Oklahoma City. The Reserves Center would be acquired by Tinker AFB. Approximately 152,000 square foot acquisition.
T-10 Hush House (B926), B3234 Test Cell Facility, and B3772	The T-10 hush house, located between two operational runways, will be re-activated. The T-10 hush house will be used for testing jet fighter engines and can accommodate either a bare engine mounted on a stand or installed in an aircraft. The sidewalls of the structure are composed of acoustic baffles designed to allow airflow into the building and attenuate sound leaving the building. The planned total number of engines to be tested annually in the T-10 facility is 106. The current plan is to construct two 50-foot-by-300-foot test facilities equipped to handle 150,000 pound-thrust-class engines. The proposed site for the new test complex is immediately south of B3234. B3772 is currently not in use and is scheduled to be demolished in 2010.
Consolidated Security Forces, South 40 Development	Construction of a 64,000 square foot facility on the south side of the base. This project is to construct a new facility to relocate and consolidate key Security Police Operations functions at a single facility. One centralized facility will reduce the response time to react to various situations.
Construct Consolidated Wing Headquarters Facility	Construction of a consolidated wing headquarters building for distinct legal staff to include a Headquarters Command Section, Resource Manager, Public Affairs, Base Plans, 72 Mission Support Group, 72 Mission Support Squadron, as well as a large Staff Judge Advocate facility. Project involves construction of a multi-story steel frame building on piers and concrete slab. Demolition of B460 and reconfiguration of the road intersection at Arnold and F Streets will also be included in the project. Construction of the new facility is required because the existing building is antiquated and is in violation of the American Disabilities Act. Existing facility also does not meet the Air Force Legal Facilities Design Guide and has insufficient Indoor Air Quality. There are problems with mold, wood rot, and the building has suffered termites in the past.
Realignment of Air Depot Road/Tinker Gate	Relocation of Air Depot Road/Tinker Gate located on the west side of the base. Relocation is required to provide an adequate and secure base entry. Relocation will alleviate current hazardous traffic congestion and will maintain the base perimeter security. The existing roadway alignment poses a safety issue and does not meet security requirements.
Phase III, 3rd Combat Communications Complex	The purpose of this project is to design and construct a new Squadron Operations Complex for the 32nd Combat Communications Squadron at Tinker AFB. The new facility will replace thirteen substandard existing facilities. The new consolidated facility will enhance the squadron's capability to train, maintain its equipment and to deploy to any location in the world. The 3rd Combat Communications Group is a tenant on Tinker AFB that provides deployable communications, computer systems, navigational aids and air traffic control services anywhere in the world. The new facility will support a squadron of approximately 141 personnel. The site is located east of Air Depot north of Reserve Road. The Squadron Operations Complex is organized around a core containing the common areas: restrooms, supply room, conference room and training room for all flights. There are three flight bays located off the core area that provide each flight with conditioned office space, electronic workbenches and drive through bay areas to store, palletize and maintain deployable equipment. The front of the facility contains offices for the Squadron Commander and the Squadron administrative functions.

2129 The projects listed above are planned for construction during roughly the same timeframe as
2130 implementation of the Proposed Action would occur. Consequently, the potential exists for
2131 cumulative environmental impacts to occur with regard to air quality, noise, socioeconomics, and
2132 traffic. Cumulative air quality and noise impacts are expected to be less than significant since all
2133 projects would be required to implement BMPs to reduce air and noise emissions below
2134 significance thresholds and comply with local noise regulations. The T-10 hush house is located
2135 in proximity to the Proposed Action site. Testing of jet engines in the hush house will generate
2136 noise similar to the noise emissions generate during airfield operations. The T-10 hush house
2137 operations would result in an increased number of engine test operations at Tinker AFB.
2138 Operations would include approximately 1.6 engine tests per day and 464 tests annually. The
2139 purpose of the T-10 hush house is to quiet the noise of engine testing, and therefore the noise
2140 produced during testing would be less than that of takeoffs. Only slight expansion of noise
2141 contours – and related noise exposure – would occur on-base, and these increases would be
2142 clustered around Building 926 and would be indistinguishable from sound levels associated with
2143 current aircraft operations. However, the proposed T-10 hush house operations will be designed
2144 to reduce noise emissions from engine testing and has gone through the Environmental Analysis
2145 Impact Process. The proposed ATCT would be designed to reduce noise emissions; therefore,
2146 noise impacts from the T-10 hush house combined with the airfield noise impacts are expected to
2147 be below significant thresholds and comply with local noise regulations.

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**SECTION 6
REFERENCES**

2150 2151 **Air Force Civil Engineer Support Agency (AFCESA). 2006. Unified Facilities Criteria (UFC)**
2152 **Airfield and Heliport Planning and Design UFC 3-230-01, 1 November 2001, Change of 19 May**
2153 **2006.**

2154

2155 2156 **American National Standard Institute (ANSI) 1983. American National Standard Institute Guide**
2156 **to the Evaluation of Human Exposure to Vibration in Buildings. ANSI S3.29-1983ANSI**

2157 2158 **Bies, D.A. and C.H. Hansen. 1988. *Engineering Noise Control*. Unwin Hyman Ltd., London,**
2158 **pp. 89-95.**

2159 2160 **Bolz, R. E. and G. L. Tuve 1976. Handbook of Tables for Applied Engineering Science, The**
2160 **Chemical Rubber Co., Cleveland, Ohio.**

2161 2162 **Christenson, S.C., R.B. Morton, and B.A. Mesander. 1992. *Hydrogeologic Maps of the Central***
2162 **Oklahoma Aquifer, Oklahoma. U.S. Geologic Survey Hydrologic Investigations Atlas, Map HA-**
2163 **724.**

2164 2165 **Department of Defense (DoD). 2003. UFC: *DoD Minimum Antiterrorism Standards for***
2165 ***Buildings, UFC 4-010-01*. October 2003 including change 1, 22 January 2007.**

2166 2167 **Federal Interagency Committee On Noise (FICON). 1992. *Federal Agency Review of Selected***
2167 ***Airport Noise Analysis Issues*. Washington, DC.**

2168 2169 **Federal Transit Authority 2006. Transit Noise and Vibration Impact Assessment. Office and**
2169 **Planning and Environment. May.**

2170 2171 **Goerke et al. 1990. Vibroacoustic Field Study of T-10 Hush House Emissions. Kirtland Air**
2171 **Force Base, New Mexico. August.**

2172 2173 **Hoagland, Bruce. 1999. *The Vegetation of Oklahoma: A Classification for Landscape Mapping***
2173 ***and Conservation Planning*. Southwestern Naturalist 45(4): 385-420.**

2174 2175 **Johnson, F.L., M.D. Proctor, T.L. Browning, G.E. Brown, and G.D. Schnell (Johnson et al.).**
2175 **1995. Native Tallgrass Prairie Assessment/Management Plan, Tinker Air Force Base,**
2176 **Oklahoma. Final report to Woodward-Clyde Federal Services, Del City, Oklahoma. Oklahoma**
2177 **Biological Survey, University of Oklahoma, Norman, Oklahoma. National Center for**
2178 **Educational Statistics (NCES). 2006. Search for Schools, Colleges, and Libraries. Transferred**
2179 **to AMEC via the Internet (<http://nces.ed.gov/globallocator/>), 27 November 2006.**

2180 2181 **Lee, R. A. 1982. Far-Field Acoustic Data for the Texas ASE, Inc. Hush House, AFAMRL-TR-**
2181 **81-148. April.**

2182 **Oak Ridge National Laboratory no date. Hush House Site Planning Bulletin.**

2183 Oak Ridge National Laboratory 1993. *Hush House Site Planning Bulletin: Volumes I Hush*
2184 *House Site Planning Bulletin, Volume II Analysis of Impacts of Hush House Operations, Volume*
2185 *III Hush House Infrasonic and Seismic Emissions* Produced by F-100 Engine Tests at Luke AFB,
2186 Arizona, and Burlington IAP, Vermont. 30 December.

2187 Oberholser, H.C. 1974. *The Bird Life of Texas*. Vol. 1. E.B. Kincaid, Jr., ed. University of
2188 Texas Press, Austin and London.

2189 Oklahoma City Convention and Visitors Bureau (OCCVB). 2006. *Oklahoma City History*.
2190 Accessed by AMEC via the Internet (<http://www.okccvb.org/history.html>), 9 November 2006.

2191 Oklahoma Department of Environmental Quality (DEQ). 2006a. Regulatory Programs.
2192 November 2006. Accessed by AMEC via the Internet (<http://www.deq.state.ok.us/AQDnew/>),
2193 22 November 2006.

2194 DEQ, Air Quality Division. 2006b. Title V Permit. December 2006. Permit No. 99-104-TV
2195 (M-2), Tinker AFB Facility-Wide Operating Permit.

2196 Oklahoma Department of Wildlife Conservation (ODWC). 2007. *Oklahoma's Endangered and*
2197 *Threatened Species and Species of Special Concern*. Accessed by AMEC via the Internet
2198 (<http://www.wildlifedepartment.com/endanger.htm>), 4 April 2007.

2199 Oklahoma Natural Heritage Inventory Database (ONHI). May 05, 2003. Federal and State
2200 Endangered, Threatened, and Candidate Species in Oklahoma by County, OK. Accessed by
2201 AMEC via the Internet, (<http://www.biosurvey.ou.edu/download/heritage/countypr0503.pdf> and
2202 <http://www.biosurvey.ou.edu/download/heritage/plants0503.pdf>), 4 April 2007.

2203 ONHI. 2007. Oklahoma Vascular Plants Database, via the Internet
2204 (<http://www.coordinatesolutions.com/ovpd/ovpd.aspx>), 4 April 2007.

2205 Oklahoma University (OU). 2006. *Oklahoma's Past, Oklahoma County*. Oklahoma
2206 Archeological Society, OK. Accessed by AMEC via the Internet
2207 (<http://www.ou.edu/cas/archsur/counties/oklahoma.htm>), 09 November 2006.

2208 Oklahoma Water Resources Board (OWRB). 2006. *Groundwater and Surface Water of*
2209 *Oklahoma County, OK*. Accessed by AMEC via the Internet (<http://www.owrb.state.ok.us>), 08
2210 November 2006.

2211 Parkhurst, D.L., S. Christenson, and G.N. Breit. 1993. *Ground-Water-Quality Assessment of the*
2212 *Central Oklahoma Aquifer, Oklahoma: Geochemical and Geohydrologic Investigations*.
2213 U.S. Geological Survey Open-File Report 92-642.

2214 Tinker AFB. 1997. *Jurisdictional Wetland Delineation of CNG Wetland, Greenway Wetland,*
2215 *GWTP Wetland, Fuel Control Facility Wetland, and Glenwood Wetland at Tinker Air Force*
2216 *Base, Oklahoma*. January 1997.

2217 Tinker AFB. 2001. *Tinker Air Force Base, Integrated Natural Resources Plan, Tinker AFB, Oklahoma.* October 2001.

2219 Tinker AFB. 2002a. *United States Air Force Environmental Assessment, Construction of Various Facilities within the South Forty Development Area at Tinker AFB, Oklahoma City, Oklahoma.* January 2002.

2222 Tinker AFB. 2002b. *Storm Water Pollution Prevention Plan.* October 2002.

2223 Tinker AFB. 2004. *OC-ALC Plan 19-2, Spill Prevention and Emergency Response Plan for Hazardous and Extremely Hazardous Material and Spill Prevention Control and Countermeasures Plan, Tinker Air Force Base, Oklahoma.* October 2004.

2226 Tinker AFB. 2005a. *Tinker Air Force Base General Plan.* 2005.

2227 Tinker AFB. 2005b. *Tinker Air Force Base Installation Summary.* 2005.

2228 Tinker AFB. 2005c. *Final Integrated Cultural Resources Management Plan (ICRMP).* December.

2230 Tinker AFB. 2006a. *Environmental Compliance Assessment and Management Program, FY 2006 Final Report.* 28 August 2006.

2232 Tinker AFB. 2006b. *Air Installation Compatible Use Zone Study.* Tinker AFB, OK. August 2006.

2234 Tinker AFB. 2006c. BASH Data. Personal Communication with Timothy Taylor, 72 ABW/CEVOE. December 2006.

2236 Tinker AFB. 2007a. Draft *Integrated Natural Resources Management Plan (INRMP).* Environmental Management Division, Tinker AFB, OK.

2238 Tinker AFB. 2007b. Personal communication between John Krupovage, 72 ABW/CEVOE, Tinker AFB and AMEC Earth & Environmental, Inc. June 28, 2007.

2240 Tinker AFB. 2007c. *Memorandum from USACE addressed to John Krupovage, 72 ABW/CEVOE, Tinker AFB. Section 404 Review for Tinker AFB, Jurisdictional Determination for Fuel Control Facility (FCF) Site, Identification Number 2007-637.* David A. Manning, USACE Tulsa District Regulatory Office, Tulsa OK. September 21.

2244 Tinker AFB. 2008a. Personal communication between the following Tinker AFB personnel: Cynthia Garrett, 72 ABW/CEVOE; Earl D'Allessandro, 76 MXW/OBWB; David Stanford, 76 PMXG/QP; Teresa Wheeler, 72 ABW/CEAN; Lou Anna Munkres, 72 ABW/CECR; Bill Dalke, 72 ABW/CEAR and AMEC Earth & Environment, Inc. April.

2248 TPW (Texas Parks and Wildlife). 2000. *Wildlife Fact Sheets – Texas Horned Lizard*. Internet
2249 Site: (<http://www.tpwd.state.tx.us/nature/wild/reptiles/thlizard.htm>) Accessed July 23, 2002.

2250 U.S. Army Corps of Engineers (USACE). 1995. *Protected Species Surveys, Tinker Air Force
2251 Base Oklahoma*. U.S. Army Corps of Engineers, Tulsa District.

2252 USACE. 2002. *Tinker Air Force Base Special Study, Oklahoma County, Oklahoma*, U.S. Army
2253 Corp of Engineers Southwestern Division – Tulsa District, October 2002.

2254 U.S. Air Force (USAF). 1991. *Natural Resources Management Plan, Tinker Air Force Base,
2255 Oklahoma*. Prepared by John R. Krupovage, Natural Resources Manager. July 1991.

2256 USAF. 1992. *Air Force Procedure for Predicting Noise Around Airbases: Noise Exposure
2257 Model (NOISEMAP) Technical Report*, Report AL-TR-1992-0059.

2258 USAF. 2001a. *Air Force Instruction 91-204, Safety Investigations and Reports*. Accessed by
2259 AMEC via the Internet (<http://afpubs.hq.af.mil>).

2260 USAF. 2001b. *Design Guide for Air Traffic Control Towers (ATCT)*. November 15, 2001.

2261 U.S. Department of Agriculture. 2003. *Soil Survey of Oklahoma County, Oklahoma*. Prepared
2262 by Natural Resources Conservation Service in cooperation with the Oklahoma Agricultural
2263 Experiment Station and the Oklahoma Conservation Commission, 2003.

2264 U.S. Environmental Protection Agency (USEPA). 1995. *AP 42, Compilation of Air Pollutant
2265 Emission Factors, Volume 1: Stationary Point and Area Sources*. Fifth Edition. January.

2266 USEPA. 2006. Surf Your Watershed, Environmental Information on Watersheds. Accessed by
2267 AMEC via the Internet (<http://cfpub.epa.gov/surf/county.cfm>), 09 November 2006.

2268 USEPA. 2007. National Emission Inventory (NEI) Database for Criteria and Hazardous Air
2269 Pollutants. Accessed by AMEC via the Internet (<http://www.epa.gov/air/data/reports.html>), 05
2270 April 2007.

2271 U.S. Fish and Wildlife Service (USFWS). 2006a. National Wetlands Inventory Maps.
2272 Accessed by AMEC via the Internet (<http://wetlandsfws.er.usgs.gov>), 08 November 2006.

2273 USFWS. 2006b. *Determination of Critical Habitat for the Whooping Crane*. Federal Register,
2274 Vol. 43, No. 94, 15 May 1978. Accessed by AMEC via the Internet
2275 (<http://www.fws.gov/cno/es/listing.html>), 30 October 2006.

2276 USFWS. 2006c. *Final Determination of Critical Habitat for the Arkansas River Basin
2277 Population of the Arkansas River Shiner (Notropis giradi)*; Final Rule. Federal Register, Vol.
2278 70, No. 197, 13 October 2005. Accessed by AMEC via the Internet
2279 (<http://www.fws.gov/cno/es/listing.html>), 30 October 2006.

2280 USFWS. 2007. Oklahoma County Endangered Species List. Accessed by AMEC via the
2281 Internet (<http://www.fws.gov/southwest/es/EndangeredSpecies/lists/>), 4 April 2007.USFWS
2282 (United States Fish and Wildlife Service).

2283 Wiss, J. F. 1981. "Construction Vibrations: State of the Art," *Journal of the Geotechnical
2284 Division, ASCE*,v. 107, no. GT2, Proc. Paper. 16030. February.

2285 Witten, Alan J., 1987. *Hush House Site Planning Bulletin. Base Comprehensive Planning. Vol.
2286 II Analysis of Impacts of Hush House Operation* , HQFLC/DEP and HQ USAF/LEEVX,
2287 1 October.

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2322 Ellen Carroll
2323 *Word Processor*
2324 Angie Salaiz
2325 *Graphics*
2326 Gerrie Gomez
2327 *Word Processor*

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APPENDIX A
PUBLIC NOTICE

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STATE OF OKLAHOMA, } ss.
COUNTY OF OKLAHOMA }

Affidavit of Publication

Gina Calame

, of lawful age, being first

duly sworn, upon oath deposes and says that he is the A.E.
of The Oklahoma Publishing Company, a corporation, which is the publisher of the

The Oklahoman, which is a daily newspaper
of general circulation in the State of Oklahoma, and which is a daily newspaper
published in Oklahoma County and having paid general circulation therein; that
said newspaper has been continuously and uninterruptedly published in said coun-
ty and state for a period of more than one hundred and four consecutive weeks next
prior to the first publication of the notice attached hereto, and that said notice was
published in the following issues of said newspaper, namely:

Fri. 1/30 - zone 5
for \$349.38

Subscribed and sworn to before me this 23rd

day of February, 2009

Dianah Featherston Gina Calame
Notary Public

My commission expires April 1, 2009



"I feel like you talked about how you wanted to get back to a lot of fun on your record. I think you're missing a song or two. That's all I'm going to say."

Bentley, 34, went back to work writing and re-

balance. He thought there were too many serious songs. But he worried the young singer-songwriter might take his criticism the wrong way.

They apparently got it right, though. The album and the title track both hit No. 1 — Bentley's sixth

"Fire" is all laughs. On "Beautiful World," Bentley, the father of a 4-month-old daughter, chooses to believe there is beauty beyond the barrage of bad news. On "Pray," a ballad he co-wrote with Rodney Crowell, he wishes peace to an ex-lover.

Public Notice

Tinker Air Force Base Invites Public Comment Environmental Assessments

Construct Air Traffic Control Tower
Re-Alignment of Air Depot Gate

The United States Air Force and the 72nd Air Base Wing have prepared two Environmental Assessments (EAs) which are available for public review and comment.

Pursuant to the Council on Environmental Quality (CEQ) regulations and in accordance with the National Environmental Policy Act, an environmental assessment has been performed to evaluate the construction of a new Air Traffic Control Tower and a separate assessment to evaluate the Re-Alignment of Air Depot Gate.

No significant environmental impacts were identified through these EAs.

The public is invited to review the draft assessments and make comments. Written comments and questions can be submitted before close of business on the 6th day of March 2009.

The final drafts for the Environment Assessments are available to the public at the Tinker Information Repository located in the Midwest City Public Library on Reno Avenue. Hours of operation are 9:00 a.m. to 9:00 p.m. Monday thru Thursday; 9:00 a.m. to 5:00 p.m., Friday and Saturday; and 1:00 to 5:00 p.m. on Sunday.

The public may submit written comments to the address below:

72d Air Base Wing Public Affairs Office

Brion Ockenfels

7460 Arnold Ave., Suite 127

Tinker Air Force Base, Oklahoma 73145

Phone: 405-739-2027/26

E-mail: brion.ockenfels@tinker.af.mil



Avoid the rigmarole of house hunting. You can quickly find the home of your dreams in the neighborhood you deserve with HomesOK.com. Search now without having to leave your computer, and get ready to do the happy dance. You're about to find your new home on HomesOK.com.

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